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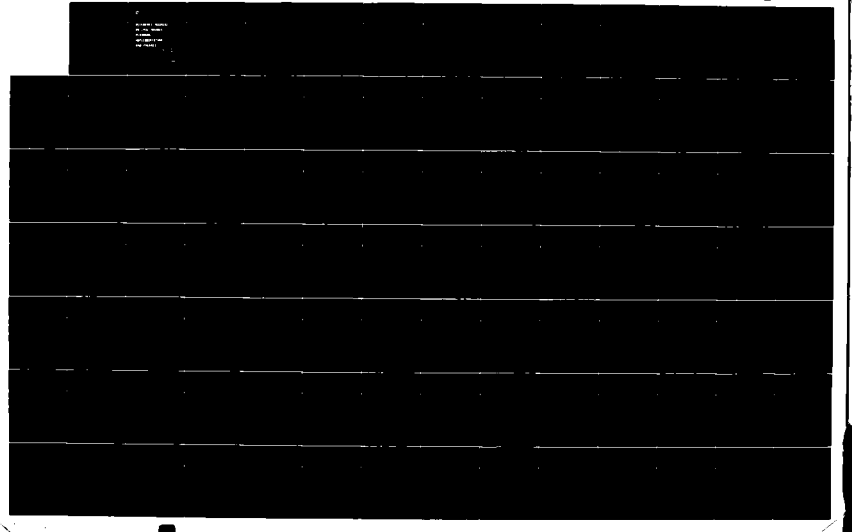

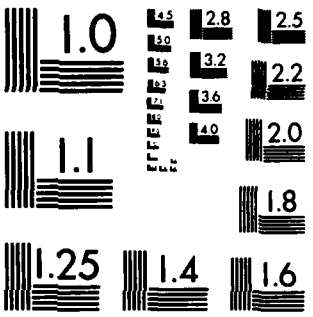

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US Army Corps
of Engineers
Water Resources Support Center
Institute for Water Resources

REFERENCE MANUAL ON CIVIL WORKS PLANNING, IMPLEMENTATION AND FINANCE

IWR POLICY STUDY 87-PS-1

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Mark W. Mugler, Editor

U.S. Army Corps of Engineers
Engineer Institute for Water Resources
Casey Building
Ft. Belvoir, VA 22060

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The Initial and Expected Effects of Increased Cost Sharing

- A Discussion Paper -

by
Mark D. Sickles

The U.S. Army Corps of Engineers is the largest Federal government agency responsible for the development of the nation's water resources. Other Federal agencies have important water development and management missions but are limited to more specialized purposes or geographical regions (e.g. Bureau of Reclamation, Soil Conservation Service, Tennessee Valley Authority). The Corps also provides engineering support to other Federal agencies, but its primary civilian responsibilities include the development and maintenance of the country's navigable waterways, ports and harbors, and multipurpose reservoirs that provide flood control, water supply, hydroelectric power, and recreation.

National spending for water resources is determined to be in the Federal interest primarily when a major investment can provide broad regional (multijurisdictional) benefits and classic public goods. Each multipurpose project must evolve out of a planning process where tradeoffs are made between the various project purposes and the geographically distributed user groups. The discounted present value of the annual national economic development benefits of a project must be greater than its costs. For any proposed project, a benefit-cost ratio greater than one (net present value benefits) is a necessary but not sole criterion for implementation. The plan must then pass through an internal review process before being authorized, and prior to funds bring appropriated, by the U.S. Congress. This economics-based analysis for Federal water investments is unique to Federal infrastructure spending. However, because Congress makes the final spending decisions, political forces are brought to bear on project distribution; Corps projects are often cited as examples of "pork barrel" Federal spending.

In the past, Corps projects have been constructed almost solely with Federal dollars. Local sponsors of Corps projects have traditionally shared in project costs by supplying lands, easements, and rights-of-ways, and providing for relocations or alterations of buildings and utilities necessary for construction. The average local investment from these sources in existing Corps flood control projects has been about 17 percent. For the inland navigation system, users pay about 10 percent of total Corps of Engineers expenditures; port users pay none of the dredging and other harbor maintenance expenditures. For project purposes that yield vendible outputs, such as water supply and hydroelectric power, 100% recovery of project costs over the life

of the project (50 years) has been the policy. In sum, the relatively low non-Federal cost share, generous repayment terms (low effective interest rates), or absence of cost sharing for certain identifiable groups of project beneficiaries has resulted in Federal subsidies that many policy makers believe we can no longer afford.

These traditional cost sharing policies served a developing country extremely well by reducing risks for economic development and human settlement which otherwise would have been beyond local means. Federal water resources agencies today operate over 850 major dams and approximately 25,000 miles of inland and coastal waterways (including 266 navigation locks), dredge 49 ports having two million plus tons of annual commerce and 301 smaller harbors, generate 145 billion kilowatt-hours of hydroelectricity (approximately six percent of the Nation's total annual output of electricity), provide 40 million acre-feet of irrigation water and 10 million acre-feet of municipal and industrial water supply, and monitor 3,400 miles of flood control levees. These investments have helped the country reach a point of development that can no longer be described in nation-building terms. Development policies have become increasingly troublesome in a more mature economy. As the older part of the country is facing infrastructure decay and the need for rehabilitation, some policy makers began to question the perceived distributional inequities and economic inefficiencies resulting from traditional water development policies. Today, however, the country is nearer to acting on recommendations that have long been made by water policy analysts; that we move toward a system where the identifiable beneficiaries of water investments pay a greater share or all of the costs associated with the investment. In addition, pending legislation (both Senate and House versions of H.R. 6) calls for local sponsors' capital while the project is being constructed and changes in the Treasury repayment policies. "Up-front" financing and full borrowing cost interest rates are new features for Federal water resource investments.

To apply a consistent nationwide cost sharing percentage for each project purpose was the recommendation of, among other studies, the often cited report Water Policies for the Future (National Water Commission, 1973). The current administration has tried to implement a similar policy but the struggle to reach a final political consensus on cost sharing percentages continues. (The late-night end to the Ninety-Eighth Congress came when legislators finally succumbed to veto threats brought on by an omnibus water development bill. The legislation, attached to the Continuing Resolution appropriations bill needed to fund practically the entire Federal government, contained cost sharing provisions not strong enough for the administration.) The water development policy debate that began with President Carter's "hit list" of 18 Federal water projects, has contributed to a policy impasse and virtual halt to major new construction starts. Of the 106 ongoing projects in the Corps of Engineer FY 1985 budget, only six were started after 1979.

On June 21, 1985 a tentative agreement on cost sharing was struck between the Senate Majority Leadership and the administration which became the basis for its version of H.R. 6 (S. 1567). When this bill passed by voice vote on March 26, 1986, it was the first time in ten years the Senate had approved an omnibus water development law. This bill was proclaimed on the Senate floor as major reform legislation that will give new life to the water resources development program. In light of recent history, the importance of the June 1985 breakthrough cannot be overstated. This agreement triggered renewed hope that an end to the water development debate was at hand. Should a successful conference between the two Houses of Congress end the impasse, the intergovernmental paradigm characterized by Federal dominance and development policies for water resource projects will of necessity become history.

The Logic Behind Changing Cost-Sharing Policy

There are two primary arguments for increasing the sponsor's share of water resource projects; increased economic efficiency and the Federal budget problem. Federal projects can be perceived as a "free good" by the local sponsors, or at least as the lowest cost alternative. The lower the cost of a project to direct beneficiaries, the larger the incentive to overbuild. Left alone, and assuming adequate resources, communities naturally respond to their water problems by considering the lowest cost alternatives. Therefore, by giving beneficiaries a larger stake in the project, more cost conscious investment decisions are foreseen. Further, for projects with clearly vendible outputs, efficient resource utilization is more likely when users pay the full cost of service including a return to capital. Many taxpayers find it inequitable, especially in times of Federal retrenchment, to subsidize a commodity for some while others pay an unsubsidized price.

The literature is replete with studies finding inefficiencies in U.S. water development policy. The following is a passage from the National Water Commission report (N.W.C, 1973):

> Present policies governing Federal and non-Federal cost-sharing arrangements in the water resources field have been established over a long period of time by unrelated congressional actions on particular projects and programs and by similarly uncoordinated administrative determinations. As a result, these policies are now inconsistent among programs, among purposes, and among agencies. The situation causes widespread confusion, results in distorted development, encourages local interests to "shop around" among agencies to get the most favorable arrangement, and results in deviations from principles of equity which require that beneficiaries should bear an appropriate share of project costs.

> The nation's water resources are now more highly used and the demands on them are so great that they are becoming increasingly valuable. New cost-sharing policies are needed to encourage improved management of water and related resources and to increase fairness in the distribution of financial burdens. Water shortages expected in the future will create an insistent demand that the users of water and water-related services pay in full for the benefits they receive.

Finally, the reality of budgetary pressures has given life to the long-recognized arguments for changing Federal water financing policy. Reducing the Federal budget deficit has provided the impetus to achieve this policy change as it has across a spectrum of Federal programs. Dealing with the budget deficit has also provided the mechanism to increase the power and responsibility of state governments. Although this broader policy direction is a longer term trend, it is one that is in concurrence with the proposed water legislation.

Project cost sharing is not the only funding change that has been proposed. Historically, the project survey study/planning process has been at 100% Federal expense. Both versions of H.R. 6 include cost sharing provisions for these 'feasibility studies'.[1] The intent is to create a working relationship with the project sponsor from the outset to ensure that the project being proposed is one that it can afford and is willing to sponsor. The Corps has already implemented study cost sharing.

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[1]The Corps of Engineers first conducts a reconnaissance study to determine whether a Federal project can solve local and regional water resources problems. Based upon the reconnaissance, the Corps and the local sponsor jointly decide whether a full feasibility study is warranted. S. 1567 and H.R. 6 propose a 50 percent non-Federal cost share of the feasibility study. One half of the non-Federal share could be paid with in-kind services. The feasibility study is conducted in the District offices under the Federal Principles and Guidelines. Public involvement is sought in the review of the initial draft report and environmental impact statement (EIS). The report is then sent to the Division office, which has been monitoring the process, for a technical review of the report and the EIS. The Division Commander then submits the report to the Board of Engineers for Rivers and Harbors (BERH). BERH's technical and economic review also takes into consideration public comment before submitting its views to the Office of the Chief of Engineers (OCE). (Footnote continued on following page.)

Regardless of the exact cost sharing percentages finally agreed to, these increases and non-Federal financing are going to initiate drastic changes in the Corps of Engineers Civil Works program. For states or project sponsors, a most fundamental result from the policy change is the addition of major water resources spending to an array of other needed current and future infrastructure investment.

The Preliminary Results of Cost Sharing Initiatives

The administration has actively supported a Federal water program based on a more user-funded approach to development in light of the deficit problems faced by the nation. For example, in 1985 for the first time in U.S. history, an administration offered its own version of an omnibus water bill (H.R. 1557 & 1558) that would authorize more than 60 projects. The administration also submitted 29 projects to be funded in the President's FY 1986 budget. The local agreements reached on these 29 projects were used to demonstrate the administration's good faith and the fact that there are good water investments left to be made across the country. All of these projects had negotiated cost shares based on early Administration-supported percentages and were used as evidence that their proposals were reasonable, good public policies. Of the 29 proposed projects, non-Federal funds would have been used to finance about 57% of the cost compared to about 12% under traditional arrangements. The Assistant Secretary for the Army for Civil Works [ASA(CW)] in testimony to the House Committee on Appropriations, Subcommittee on Water Resources regarding the FY 1986 budget said:

> We believe these projects demonstrate further the willingness and ability of local sponsors to increase their financial participation in new project development when a strong, productive project exists, a project sure to provide a return on their financial investment.

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[1](Cont.) Upon further review, the Chief sends the proposed report to the heads of other Federal agencies and the governors of the affected states for comment. OCE considers comments on the proposed report and EIS, prepares the final versions before submitting them the Assistant Secretary of the Army for Civil Works (ASA(CW)). If approved, it is sent to the Office of Management and Budget (OMB) for comments on how it relates to the President's program. ASA(CW) also transmits OCE's report to Congress.

The first big test of administration policies, however, came in late FY 1985 as Congress passed a Supplemental Appropriations bill (P.L. 99-88, August 15, 1985) which included 41 Corps new start construction projects. These projects were to be built "under terms and conditions acceptable to the Secretary of the Army (or under terms and conditions provided for in subsequent legislation when enacted into law) as shall be set forth in binding agreements with non-Federal entities desiring to participate in project construction." This language obviously gave the Secretary enormous flexibility in negotiating the terms of the agreements. The law also gave him a deadline beyond which the funds would no longer remain available. The broad cost sharing terms were easily determined, however, because of the existing Senate Majority Leadership/administration compromise which had become the basis for the Senate bill, S. 1567. Although negotiating binding Local Cooperation Agreements (LCAs) for these 41 projects under a time deadline may not be totally analogous with more "normal conditions" under statutory law, this exercise, just completed on June 30, 1986, gives us the best indication to date of what the proposed cost sharing percentages will do to the "traditional" Corps project.

Of the 41 projects in the Supplemental, 32 LCAs were successfully completed, 5 did not require LCAs (including 4 inland waterway lock and dam projects), 3 were selected too early in the planning process to meet the deadline, and 1 sponsor declined to sign the binding agreement. Since these projects were formulated under far different circumstances as far as the local sponsor's share is concerned, it is reasonable to expect that alterations in the original Corps plan would be necessary to meet sponsor financial capability. In fact, twelve (29%) of the LCAs were negotiated for projects that constituted less than the original Corps plan. Some of these reformulations of the project plan will result in a completed project when constructed, while the other reformulations are the first phases of a more comprehensive overall plan. Six of the 12 LCAs covered the initial phases of deep draft navigation projects. Of 10 harbor projects with successful LCAs shown in Table A, these same 6 sponsors signed up for an average of 36.7% of the total estimated project cost (leaving 4 harbor projects at 100% of the original plan; ranging in scope from $10 million to $100 million). The agreed to costs in these "phased-in" project LCAs range from $8 millon to $300 million out of a possible total estimated project cost ranging from $58 million to $486 million. The incentive for the sponsor to build only a portion of the project is due primarily to the reduction of risk. Once the initial benefits are realized, the project can be expanded with more certainty.

One of the best examples of a major harbor that was reformulated or scaled back to begin a phased construction alternative is Norfolk Harbor. The authorized project called for deepening the main channels from 45 to 55 feet and inner channels to lesser depths, along with the construction of fixed mooring anchorage areas at an estimated total project cost of $400 million. The initial phase of the project covered in the LCA

TABLE A

TOTAL ESTIMATED, AND INITIAL PHASE COSTS OF
NEW START HARBOR NAVIGATION PROJECTS IN THE
FY 86 SUPPLEMENTAL APPROPRIATIONS LAW, P.L. 99-88

PROJECT	ESTIMATED PROJECT COST (000'S) TOTAL PROJECT		INITIAL PHASE		PERCENT OF TOTAL IN LCA
MISSISSIPPI RIVER SHIP CHANNEL, LA	486,000		150,000		30.8%
MOBILE, AL	415,000		89,000		21.4%
NORFOLK, VA	400,000		50,000		12.5%
BALTIMORE, MD	370,000		300,000		81.0%
KILL VAN KULL, NY,NJ	290,000		145,000		50.0%
TAMPA, FL	58,000		8,000		13.8%
Subtotal		2,019,000		742,000	36.7%
Without Baltimore		1,649,000		442,000	26.8%
FREEPORT, TX	100,000		100,000	100.0	
SACRAMENTO, CA	74,000		74,000	100.0	
SAVANNAH, GA	14,000		14,000	100.0	
JONESPORT, ME	10,000		10,000	100.0	

increases the depth of the outbound lanes of the main channels from 45 to 50 feet at an estimated total project cost of $50 million. Light ships calling the port do not need as deep a channel on the way in. Should the business develop (larger and better utilized ships) as expected, the port authority will be in a better position to judge whether a deeper and wider project is warranted.

One of the most unique total project reformulations was done on a reservoir in Utah called Little Dell Lake. This project was completely replanned within the nine months given to sign a LCA from the enactment of P.L. 99-88. Originally the plan called for a dam 253 feet high creating a lake with a capacity of 30,000 acre-feet for flood control, municipal and industrial water supply, recreation, and fish and wildlife. Included were two diversion facilities. The reformulated plan maintains the original flood control storage but provides less for water supply. It consists of a dam 226 feet high and a lake of 20,500 acre-feet. The cost of the reformulated plan is $49.3 million, down from approximately $100 million under the original plan. The new package drops plans for one of the diversions and defers the recreation facilities. Under the new cost sharing formulas, the non-Federal sponsor share was $25.5 million during construction and 100% of the cost for operations and maintenance.

The Long Term Effects of Cost Sharing on the Corps of Engineers

The implications of non-Federal cost sharing increases for Corps' projects and planning are enormous. The ultimate responsibility for project formulation will now be shared between the state and local project sponsors and the Federal government. However, each district of the Corps will find itself with different challenges depending on the capabilities and institutional constraints faced by potential project sponsors. Estimating the cumulative impact of these policy changes is difficult. But because major projects have substantial local, regional, and national impacts, it is important to be conscious of the three or more points of view among the levels of government and other stake holders that are often at odds. Disagreements will surface around the type of project, its scope, formulation, or the inclusion of certain project purposes to solve physically unique water problems or take advantage of the opportunities presented by the site.

In March 1983, new directions were given to the Federal water resource agencies on how to plan for sound water projects. Replacing the Principles, Standards and Procedures for Water Resources Planning, were the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, or "Principles and Guidelines", or simply the P&G. The P&G determines that the Federal objective is to "contribute to national economic development consistent with protecting the Nation's environment, pursuant to national

environmental statutes, applicable executive orders, and other Federal planning requirements." "All reasonable alternatives" are to be evaluated including the one which "reasonably maximizes net national economic development benefits", called `the NED plan'. Furthermore:

> Plans may be formulated which require changes in existing statutes, administrative regulations, and established common law; such required changes are to be identified. [Principle 5, Alternative Plans, (a)]
>
> Each alternative plan is to be formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. [Principle 5, Alternate Plans, (d)]

Any plan recommending Federal action is to be the NED plan unless the Secretary of a department or head of an independent agency grants an exception to this rule. Exceptions may be made when there are overriding reasons for recommending another plan. The flexibility inherent in these statements may become the basis for reconciling the differing perspectives on projects being planned for jointly by states or local sponsors and the Corps of Engineers. The acceptability criterion is assumed to include the consideration of the financial capabilities of local sponsors. If the plan cannot be financed by the local sponsor (or the state will not become a co-sponsor), then it may be found unacceptable. It is reasonable to assume that policy guidance should eventually be issued to help determine when these financial constraints become an "overriding" reason for recommending less than the NED plan. The immediate problem is the reevaluation needed on the large backlog of project plans and designs that were drawn up in a very different environment.

For the long term, the following are some issues which must be resolved at the Federal level: At what point in the planning process can commitments to project sponsors on financial objectives become constraining factors in plan formulation? Could the financially constrained/locally acceptable plan be the NED plan because of the acceptability criterion? Will district-level personnel have the authority to make needed commitments to state and local leaders to avoid the chance of agreed-to plans being negated in the approval process? In the two-phase study process, what type of financial analysis and agreement needs to be completed in the reconnaissance study phase versus the kind of analysis needed for the feasibility study? What kinds of enforcement mechanisms will be useful or necessary in living with the local cooperation agreements?

The most important input the Corps can provide as an extension of its benefit-cost study is the identification and documentation of those receiving project benefits. Cost recovery strategies based on beneficiaries is central to revenue-supported financing. Since economic benefits cannot always be directly translated into cash flows, the need for training on how to

incorporate this information into, or combine with, a traditional benefit-cost study is evident. Corps planners will also need to become familiar with the most basic traditional public financing instruments and institutions.

The basic tenet of the increased cost sharing is to bring a market test to bear on potential projects. Although this is a simple policy with broad appeal, implementing it will cause a reexamination of many "standards" or "criteria" that in the past have been considered inviolable. While this is recognized in the abstract, it is not yet clear where these standards can be changed to produce the savings necessary to make Federal projects more affordable. Other alternatives for lowering Federal project costs are phasing the development of separable project elements or limiting the project to fewer purposes. Increased cost sharing might also increase the incentive to formulate projects heavily with purposes having the lowest non-Federal share. (Single purpose flood control reservoirs may become feasible because smaller flood impoundment structures reduce the land requirement and can provide adequate levels of protection when regulated at low levels. On the other hand, water supply investments can be more easily financed because the stream of benefits are more easily recovered.)

An often heard criticism from non-Federal project sponsors is that the Corps does not give the people what they really want, e.g. they overbuild, goldplate, etc. When projects have multiple purposes, this determination of what the "the people really want" is even more difficult. In the past, project sponsors did not have to bear the costs of the "extra" demands made by the public-at-large (Federal government). The opposition of one group or another was placated at little or no additional expense to the local sponsor. Sometimes the state and the local government(s) disagree over project priorities.

In almost every state there are political tensions between the rural interests and metropolitan areas. At times these tensions are more visible and confrontational than most Federal/State relations ever become. A classic example of how these forces clash in water resources policy would be an interbasin water transfer from rural areas to metropolitan areas to meet present or expected future water supply needs. Rural interests may adamantly oppose giving up local water (in western states they will likely own the water) or the building of a structural impoundment. Even if a structural solution is agreed to, negotiating the use of the storage can become a problem. Rural or downstream sponsors will likely want to maximize storage allocated to flood control while the urban or upstream sponsor will want to maximize water supply. In the past, Corps of Engineer planners were able to play the role of "honest broker" in these informal negotiations. In the future, Corps/sponsor partnership planning and the new financial responsibilities will work to give the states more input into the process at every point. This "new partnership" is likely to substitute the state for the small, unsophisticated local sponsor(s). In fact, in the

recent LCA negotiations for flood control projects in poorer areas, the state, rather than the local government, was often the official project sponsor.

The proposition that project design is negotiable raises some novel risk considerations. For instance, the traditional criteria used to determine acceptable risk protects against all but the most improbable conditions and must be revisited to consider the wishes of those receiving the benefit. Undoubtedly, the institutional resistance of many professional engineers to risk-benefit-cost tradeoffs will impact the decision-making process. But these tradeoffs may be inevitable in order to enable some communities to receive any degree of flood protection. The Corps may have to present the project sponsor with several alternatives from which to choose. Each alternative, which must necessarily have a demonstrable Federal interest, must weigh the costs and benefits of the traditional standards. The study process may begin with fewer design constraints.

All of the previous discussion leads to one of the primary challenges the Corps will face; to better communicate with its public. Talking in acronyms and engineering jargon is not communicating. What is a PMF? Freeboard? Why is a more expensive proposed solution sometimes better than a less expensive alternative? Explanations of how Life Cycle evaluations of an investment can save the sponsor O&M costs are vital. On the other hand, communication involves listening to what your partner is saying. Internal communication is also very important. Project sponsors must hear the same thing from the planners that they hear from the engineers. An interdisciplinary team approach is the only way to plan within the Corps and between the Corps and its project sponsor.

The states and the Corps leadership believe there is an opportunity under new cost sharing policies to design a better system for a simpler and more streamlined planning and development process. This could be a realistic objective with only two primary partners reaching agreements in the project formulation process. However, getting the projects through the planning process is only a first step in streamlining project implementation and to the commitment of Federal funds. After the initial Federal funding, continued Federal funds are critical to sponsors who have made financial commitments. Funding reliability is one of the many completion risks facing the sponsor that must be reduced as much as possible. The coordination and scheduling of funds from the sponsors and the Federal government will present monumental challenges.

STATE WATER RESOURCES MANAGEMENT INSTITUTIONS, CAPABILITIES, CONSTRAINTS AND ASSISTANCE PROGRAMS

excerpted from

THE FUTURE OF INTERGOVERNMENTAL RELATIONS
and
THE U.S. ARMY CORPS OF ENGINEERS

Changing Traditions and Building New Partnerships

by

Mark D. Sickles

Institute for Water Resources
U.S. Army Corps of Engineers
and the
Technology and Science Policy Program
Georgia Institute of Technology

Constitutional and Statutory Budget and Debt Limitations

Constitutional and statutory provisions that constrain spending are of three major types: (1) those that require balanced budgets; (2) those that restrict the ability to incur general obligation debt; and (3) those that prescribe the management of impending or actually incurred deficits (NASBO, 1982). An array of these state fiscal discipline mechanisms is shown in Table I.

Balanced budget requirements have been a long-standing tenet of state public finance. All states except Vermont have constitutional or statutory mandates that limit budget deficits; however, the stringency of these requirements varies greatly among states. The language of a balanced-budget law typically calls for the state general fund, appropriations, or expenditures to balance with estimated or actual revenue collections (National Association of the State Budget Officers (NASBO), 1982.)

Federal and State fiscal policies treat debt differently in budgeting and reporting. State budgets separate operating and capital budgets, i.e. ongoing program expenditures from major construction and renovation of public assets. Most states and/or local governments incur debt by issuing tax-exempt bonds to finance public investments. Only the current annual payment of principal and interest is accounted for in the year's budget. The Federal budget does not make this distinction; however, P.L. 98-501, which became law in 1984, for the first time calls for a Federal accounting of capital expenditures. Consequently, the meaning of a "balanced budget" differs between the two. If the Federal government were to account for its military and civilian capital investments as states do, its budget would be in much greater "balance".

Table II is the result of a survey of the various limits imposed by states on debt financing by state and local governments. The survey found that only four states have no restrictions on their own general obligation debt. Many of these limits are high enough that they do not pose a real constraint, and the affected states have an effectively unlimited legal debt capacity. Twenty-two states require a statewide referendum for any issuance of general obligation debt. Of these, nine states allow debt above constitutional limitations if approved by the voters. The National Association of State Budget Officers (NASBO) has determined that in 16 states constitutional restrictions on debt above a certain amount have the effect of requiring a <u>de facto</u> balance budget, and a constitutional amendment would be required to remove the restrictions. (NASBO did not include in the 16 those states whose ceilings could be overridden with voter approval short of a constitutional amendment.) (NASBO, 1982). One reason that some states have a limited general obligation debt authority is that the debt limit was established long ago, when the purchasing power of the dollar was much greater. As of 1983, there were eight states that had

Table I

State Fiscal Discipline Mechanisms

STATE	Tax and Expenditure Limitations	Balanced Budget Requirement	Require Super-Majority Vote to Pass Tax	Index Income Tax	Gubernatorial Line-Item Veto	Fiscal Note Review Procedure	Program Evaluation & Sunset	"Rainy Day" Funds
TOTAL	18	49	7	10	43	41	29	24
New England								
Connecticut		X			X	X	X	X
Maine		X		X			X	
New Hampshire		X				X	X	
Rhode Island	X	X				X	X	X
Vermont							X	
Mideast								
Delaware		X	X		X		X	X
Maryland		X			X	X	X	
New Jersey		X			X	X		
New York		X			X			X
Pennsylvania		X			X	X	X	
Great Lakes								
Illinois		X			X	X	X	
Indiana		X				X	X	X
Michigan	X	X			X	X		X
Ohio		X			X	X		X
Wisconsin		X		X	X	X		
Plains								
Iowa		X		X	X	X		X
Kansas		X			X	X	X	
Minnesota		X		X	X			X
Missouri	X	X			X	X		X
Nebraska		X			X	X		X
North Dakota		X			X			
South Dakota		X	X		X	X		
Southeast								
Alabama		X			X	X	X	
Arkansas		X	X		X	X		
Florida		X	X		X	X		X
Georgia		X			X	X	X	X
Kentucky		X			X	X		X
Louisiana	X	X	X		X	X	X	
Mississippi		X	X		X	X		X
North Carolina		X				X		
South Carolina	X	X		X	X	X	X	X
Tennessee	X	X			X	X	X	X
Virginia		X			X	X		X
West Virginia		X			X	X	X	
Southwest								
Arizona	X	X		X	X	X	X	
New Mexico		X			X	X	X	X
Oklahoma		X			X		X	
Texas	X	X			X	X	X	

Table I Cont'd.

STATE	Tax and Expenditure Limitations	Balanced Budget Requirement	Require Super-Majority Vote to Pass Tax	Index Income Tax	Gubernatorial Line-Item Veto	Fiscal Note Review Procedure	Program Evaluation & Sunset	"Rainy Day" Funds
Rocky Mountain								
Colorado	X	X		X	X	X	X	X
Idaho	X	X			X	X		X
Montana	X	X		X	X	X	X	
Utah	X	X			X	X	X	
Wyoming		X			X	X		
Far West								
California	X	X	X	X	X	X		X
Nevada	X	X				X		
Oregon	X	X		X	X	X	X	
Washington	X	X			X	X	X	X
Alaska	X	X			X		X	X
Hawaii	X	X			X		X	

NOTE: In several cases, the measure has been adopted by a state, but not yet implemented.

Source: U.S. Advisory Commission on Intergovernmental Relations, Significant Features of Fiscal Federalism, 1984.

no general obligation debt outstanding (Bureau of the Census, 1984).

For a Civil Works Project, a state with a constitutional limitation on debt could fund the entire non-Federal share in one fiscal year, or finance that share with annual appropriations, or make appropriations in advance of construction to "save" for the project or issue revenue bonds, since revenue-supported debt is usually exempt from state constitutional prohibitions.

Many states bypass referendum or other requirements for debt issuance by establishing special authorities. These authorities are empowered to issue bonds to finance certain types of projects. They are limited to the issuance of revenue-supported debt that is ordinarily not backed by the full faith and credit of the state.

In water resources management, states have established three kinds of authorities to finance water on a revenue-supported basis. The first kind of authority is statewide. An example is the Oklahoma Water Resources Board, which is authorized to issue revenue bonds and to lend the proceeds to communities that otherwise couldn't borrow on their own. Several states have similar revolving loan programs and five states have bond banks that act as financial intermediaries in raising funds. A second kind of authority is a substate regional organization that oversees hydrologic basins and is exemplified by the Conservancy Districts in Ohio or the River Authorities in Texas. These organizations are equipped to plan and construct projects on their own, sponsor Federal projects, and finance water-related investments within their respective jurisdictions. The third and most common substate entity created to finance water investments are the smaller special districts, e.g. flood control districts, drainage districts. These are created locally through powers granted by the state and have various revenue raising capabilities, but do not usually have any permanent professional expertise.

Since general obligation capability is reduced by limiting the taxing powers of the government, the incidence of special districts or authorities can be expected to increase with an increase in tax limitation acts (more on tax limitations below). With the increase in special authorities, the use of revenue-based user financing increases. This type of financing has advantages for financing some water projects in an era of scarce fiscal resources. Not the least of these advantages is that a state's or community's general obligation capability can be saved for public projects where beneficiaries are harder to identify. A primary disadvantage of paying off debt from water use charges is that these fees cannot be deducted in the form of state and local taxes from constituents' income subject to Federal tax. In addition, G.O. bonds usually have lower interest rates because governments pose a smaller risk to the investor than do project revenues. Presently, the movement toward the use

Table II

State Imposed Constraints on Debt Financing

	MAGNITUDE OF STATE GENERAL OBLIGATION DEBT ALLOWED	STATE LIMITATIONS ON DEBT OF LOCAL GOVERNMENTS	STATE REFERENDUM REQUIREMENTS FOR: ISSUANCE OF G.O. DEBT FOR: STATE	LOCALS	INTEREST RATE CEILINGS
ALABAMA	$300,000 Constitutional Cap without referendum	Cities-G.O debt allowed to 20% of the assessed valuation of taxable property	Yes	Yes	8% (may be changed shortly)
ALASKA	No limit with approval of voters	None	Yes	Yes	None
ARIZONA	$350,000 Constitutional cap	LIMIT - 10% of assessed valuation for cities and counties	N/A	None	None
ARKANSAS	No limit	City/county-5 mills allowed per project	Yes	Yes	Specified in each authorization
CALIFORNIA	No limit	Prop. 13-limits property assessment and property tax rates	Yes	Yes, req. 2/3 vote	State-11%, to sunset in 1986 locals - 12%
COLORADO	Constitutionally prohibited, $100,000 for casual deficits	Counties-1 1/2% of assessed valuation municipalities-3% of assessed valuation No limits on special districts and for water development	N/A	Yes	Yes
CONNECTICUT	Statutory - 4 1/2 times the previous years tax receipts	Very limiting, sliding scale based on tax receipts and by purpose from 2 1/2 to 4 1/2 times receipts	No	Yes	None

Table II Cont'd.

	MAGNITUDE OF STATE GENERAL OBLIGATION DEBT ALLOWED	STATE LIMITATIONS ON DEBT OF LOCAL GOVERNMENTS	STATE REFERENDUM REQUIREMENTS FOR: ISSUANCE OF G.O. DEBT FOR: STATE	LOCALS	INTEREST RATE CEILINGS
DELAWARE	1 1/2 times the General Fund reserve of the preceeding year	Only for school districts	No	Yes	None
FLORIDA	50% of tax revenues for average of two preceeding fiscal years	Counties, municipalities 10 miles, Water Mgt. 1 mile special districts-referendum	No	No	Bond buyer 20-Bond index plus 150 basis points
GEORGIA	10% of prior year's receipts	None	No	Yes	None
HAWAII	18.5% of average of prior 3 years General Fund revenues	County-15% of assessed value of total property	No	No	9.5%, but under temporary increase to 14% ending 6/30/87
IDAHO	$2,000,000, unless approved by the voters, very little debt outstanding	2% of market valuation of property	Yes	Yes, 2/3 vote but simple plurality for water & sewer	None
ILLINOIS	Statutory, $6.4 Billion of which $1.7 B is available 5/85	None	No	No	125% of Bond Buyer 20-bond index
INDIANA	Constitution prohibits debt	2% of assessed valuation valuation of taxable property for all political subdivisions	N/A	No, but can be stopped with petition & challenge	None
IOWA	$250,000 cap without referendum	Cities - 5% of assessed valuation, a different base is used for calculating G.O. debt limit than for tax limitations	Yes	Depends on purpose of debt, if defined as Essential Corporate Purpose not needed (e.g., water)	None
KANSAS	Constitution prohibits debt	15% of assessed valuation must comply with State Budget Law and Cash Basis Law	N/A	Depends on purpose	Bond Buyer 20-Bond Index plus 2%

Table II Cont'd.

	MAGNITUDE OF STATE GENERAL OBLIGATION DEBT ALLOWED	STATE LIMITATIONS ON DEBT OF LOCAL GOVERNMENTS	STATE REFERENDUM REQUIREMENTS FOR: ISSUANCE OF G.O. DEBT FOR: STATE	LOCALS	INTEREST RATE CEILINGS
KENTUCKY	$500,000 unless approved by voters	None	Yes	No	None
LOUISIANA	Statutory-Annual debt service is limited to 10% of average revenues over the previous three years	Limited by purpose and by % of assessed valuation	No	No, but if 5% of voters petition then referendum must be held	No, usually specified in authorizing legislation
MAINE	$2,000,000, without voter approval	None	Yes	Depends on individual city/town charter	None
MARYLAND	No limit	None	No	No	None
MASSACHUSETTS	No limit, requires 2/3 majority in Legislature	City-limited to 2 1/2% of its equalized valuation, Town-limited to 5%, can get approval for higher amounts from State Finance Board	No	After announcement, citizens have 20 days to petition for 12% of registered voters or 12,000 voters to force a referendum	None
MICHIGAN	Limited by Statute for each purpose	Counties, Charter Townships - 10% of assessed valuation, Home Rule Cities 10% plus exclusions for Special Assessment & Revenue Bonds, General Law Townships - no debt limitation	Yes	Yes, for issues requiring an unlimited tax pledge	18%
MINNESOTA	No limit on specified purposes	7 1/3% of assessed valuation, for Special Assessments - only 20% of a revenue-backed issue can be from higher taxes	No	Yes, if debt is not issued at a greater than $300,000/ quarter	Non for state, local limit based on Bond Buyer 20 Index, (round up to next whole number and add one percentage point, add one more point for Special Assessment Issues)

Table II Cont'd.

	MAGNITUDE OF STATE GENERAL OBLIGATION DEBT ALLOWED	STATE LIMITATIONS ON DEBT OF LOCAL GOVERNMENTS	STATE REFERENDUM REQUIREMENTS FOR: ISSUANCE OF G.O. DEBT FOR: STATE	LOCALS	INTEREST RATE CEILINGS
MISSISSIPPI	1 1/2 times the sum of all revenue collected in any of the last for years	10% of assessed valuation with provisions to go to 15% in some cases	No	Petition of 10% of voters or 1500, whichever is greater, is necessary to force referendum	11% for G.O. 13% for revenue
MISSOURI	$1,000,000 without voter approval	5% of assessed valuation	Yes must receive 2/3 approval	Yes must receive 2/3 approval	None
MONTANA	No limit, requires 3/4 majority in both state houses	Cities & towns - 28% of taxable valuation, counties - 11% additional $s for water & power	used in some cases	Yes	None
NEBRASKA	$100,000 limit	no limits	N/A	yes	yes, various statutory rates
NEVADA	$200 million	10% of assessed property valuation for any debt	yes	yes	no
NEW HAMPSHIRE	No limit	Based on equalized assessments of values, up to 7% for cities and towns	No	No	None
NEW JERSEY	1% of appropriations	Cities - 3 1/2% of equalized valuation Counties - 2%	Yes	Require reading period	None
NEW MEXICO	$200,000, but voters can approve up to 1% of state's assessed property valuation	4% of assessed valuation but no limit on water and sewer debt	Yes	Yes, for all purposes	10%, but can be waived by the Board of Finance

Table II Cont'd.

	MAGNITUDE OF STATE GENERAL OBLIGATION DEBT ALLOWED	STATE LIMITATIONS ON DEBT OF LOCAL GOVERNMENTS	STATE REFERENDUM REQUIREMENTS FOR: ISSUANCE OF G.O. DEBT FOR: STATE	LOCALS	INTEREST RATE CEILINGS
NORTH CAROLINA	No limit	8% of assessed valuation for all political subdivisions	Yes All gov'ts are under 2/3 Net Debt Rule can authorize up to 2/3 of the principal retired in the previous year without a referendum, 10% of voters can petition for referendum for any issuance	Yes	None
NORTH DAKOTA	Statutory $10 million maximum	Cities and Counties limited to 5% of assessed valuation	No	Yes	None
OHIO	Only highway G.O. debt	Yes, based on purposes and assessed valuation	Yes	Yes	State-none Local - based on project purposes allowed
OKLAHOMA	Requires Constitutional Amendments for any debt	5-10% of assessed valuation, no limit on G.O. debt for public utilities, can be overridden by "absolute need determination" with 3/5 vote	Yes	Yes	10% for G.O., 14% for Public Trusts which issue revenue-backed debt according to legal charter
OREGON	Requires Constitutional Amendments, these set out limits according to purposes (total is 15% of State's True Cash Value)	Cities-3% of true cash value Counties-2% of true cash value, Water for population over 300 - 10%	Yes	Yes	State-13%, State Treasure can approve 14% (Locals-none)
PENNSYLVANIA	No limit	No limit	Yes	Yes	None
RHODE ISLAND	Only $50,000 without voter approval	Maximum aggregate Debt is 3% of assessed valuation, Director of Administration can approve debt over this amount upon appeal	Yes	Yes	None

Table II Cont'd.

	MAGNITUDE OF STATE GENERAL OBLIGATION DEBT ALLOWED	STATE LIMITATIONS ON DEBT OF LOCAL GOVERNMENTS	STATE REFERENDUM REQUIREMENTS FOR: ISSUANCE OF G.O. DEBT FOR: STATE	LOCALS	INTEREST RATE CEILINGS
SOUTH CAROLINA	5% of prior year's revenues	Debt is not to exceed 8% of the assessed valuation of taxable property unless put to a referendum	No	Yes, if debt is to exceed 8%	7%, Budget and Control Board can approve a higher rate if if reasonable
SOUTH DAKOTA	$100,000	None	N/A	Yes	None
TENNESSEE	Must allow for 150% revenue for all debt outstanding	No regulation of long term debt, Aid from Division of of Local Finance	No	Must publish intentions and give 2-3 week comment period, voters can challenge in court	Some individual limits are written into authorization
TEXAS	5 agencies have Constitutional authority to issue G.O. debt, Amendments are required each year	Counties-$0.6/$100 valuation cities-$1.5/ $100 valuation Home-Rule cities - $2.5/$100 valuation Water Districts-unrestricted	Yes	Yes, various requirements	15%
UTAH	1-1/2% of reasonable fair cash value of the state's assessed property valuation	4% general purpose + 4% for water, sewer, lighting of assessed net valuation of property	No	yes, in all G.O., sometimes on revenue	None
VERMONT	Legislature can only issue bonded debt for 90% of what was paid off in the previous year	10% of their assessed valuation but there are many exclusions including water and sewer	No	Yes, min. approval ratio, a petition can force another vote	None
VIRGINIA	3 types of full faith & credit debt; generally new debt must be put to referendum (9B) unless the debt is backed by revenues (9C) or is needed to meet an emergency (9A)	Some regulation by State Commission on Local Debt	on 9B	Yes	None

Table II Cont'd.

	MAGNITUDE OF STATE GENERAL OBLIGATION DEBT ALLOWED	STATE LIMITATIONS ON DEBT OF LOCAL GOVERNMENTS	STATE REFERENDUM REQUIREMENTS FOR: ISSUANCE OF G.O. DEBT FOR: STATE	LOCALS	INTEREST RATE CEILINGS
WASHINGTON	Constitution - 9% of average General Fund revenues over past 3 years, Statutory - 7% (same) statutory limit can be overcome more readily	No	Yes	No	None
WEST VIRGINIA	Constitution prohibits	No	N/A	Yes	Yes, varies for authorized purpose, written into Amendment
WISCONSIN	Percentage of assessed property valuation, $100,000 on casual deficits	5% of assessed valuation plus many procedural requirements	No	Some are mandatory, small % of voters can force referendum	None
WYOMING	up to 1% of state's assessed property valuation, there is no outstanding G.O. debt	4% of assessed valuation +4% for sewer projects, no limit for water purposes	Yes	Yes	No

Source: Interviews with state treasury department officials.

of revenue financing because of tax limitations has slowed because this type of legislation, popular in the late 1970's and early 1980's, seems to have lost momentum. In 1984, several Proposition 13-type referenda were defeated across the country.

Smith (1985) argues that the cost of using general obligation bonds is not necessarily less expensive than revenue bonds, and that individual circumstances help determine whether general obligation debt is less expensive than revenue-supported debt. Some water utilities have such good credit histories that their ratings can be as high as those of the local government. In addition, the cost of revenue bonds can be lowered, sometimes dramatically, by simply increasing the number of underwriters bidding.

Column 2 of Table II displays some of the debt limitations placed by states on local units of government. Only ten states have no restrictions on the debt of their localities. Column 3 shows whether a state requires a referendum for general obligation debt at either the state or local level. Thirty-three states require that voters in lower political subdivisions approve the subdivision's debt. (Various town or city charters may impose their own requirements). Finally, interest rate ceilings mandated by states are shown in Column 4. These ceilings caused quite a few problems in inflationary, high interest rate periods, but are not currently a major impediment to financing.

State-Imposed Tax Limitations

States often place restrictions on the taxing authority of substate units. There are a number of forms that these restrictions take. All but five states place some kind of restriction on lower-level governments by limiting property tax rates and/or assessments. Table III illustrates the types of limits placed on counties (C), municipalities (M), and school districts (S) for all fifty states. Eighteen states have laws limiting what the state itself can levy in taxes.

Most states exempt from these tax limitations the principal and interest payments on general obligation debt. Therefore, these restrictions don't directly affect capital financing with debt.

State Assistance to Local Governments

Three major trends have been observed in the growth of the municipal bond market: first, the increase in special districts and statutory financing authorities; second, the increased use of revenue bonds in lieu of general obligation bonds; third the increased use of tax-exempt bonds for private sector activities.

Table III

Restrictions on State and Local Government Tax and Expenditure Powers (October 1984)

States	State Imposed Limits on Local Governments							
	Overall Property Tax Rate Limit	Specific Property Tax Rate Limit	Property Tax Levy Limit	General Revenue Limit	General Expenditure Limit	Limits on Assessment Increases	Full Disclosure	Limits on State Governments
Total Number	12	31	21	6	6	7	13	18
Alabama	CMS[***]	CMS[*]						
Alaska	CMS[**]		CM[**]					Const.[***]
Arizona			CM[***]		CMS[***]	CMS[***]		Const.[***]
Arkansas		CMS[*]	CMS[***] 1/					
California	CMS[***]				CMS[***]	CMS[***]		Const.[***]
Colorado		CS[*]	CM[*]		S[**]		CMS[***]	Stat.[**]
Connecticut								
Delaware		S[*]	C[***] 1/					
Dist. of Col.								
Florida	CM[***]	CMS[*]					CMS[**]	
Georgia		S[*]						
Hawaii							C[**]	Const.[***]
Idaho		CMS[*]	CMS[***]					Stat.[***]
Illinois		CMS[*]					CMS[***]	
Indiana			CMS[***]					
Iowa		CM[*]				CMS[***]	CMS[*]	
Kansas		3/	CM[**]		S[**]			
Kentucky	CMS[*]	CMS[***]				CMS[***]		
Louisiana		CMS[**]	CMS[***] 1/					Stat.[***]
Maine								
Maryland				CM[***]		CM[**]	CM[**]	
Massachusetts			CMS[***]					
Michigan	CS[*]	M[*]	CMS[***]				CMS[***]	Const.[***]
Minnesota		S[*]	CMS[**]	M[**]	S[**]			
Mississippi		CMS[*]	CMS[***]	CMS[***]				
Missouri		CMS[*]		CMS[***]				Const.[***]
Montana		CMS[*]					CMS[**]	Stat.[***]
Nebraska		CMS[*]		CMS[***] 5/				
Nevada	CMS[*]	S[*]	CM[**]					Stat.[***]
New Hampshire								

Table III Cont'd.

	State Imposed Limits on Local Governments							
States	Overall Property Tax Rate Limit	Specific Property Tax Rate Limit	Property Tax Levy Limit	General Revenue Limit	General Expenditure Limit	Limits on Assessment Increases	Full Disclosure	Limits on State Governments
New Jersey			C**		MS**			
New Mexico	CMS*	CMS**	CMS***			CMS**		
New York		CMS*				CM***2/		
North Carolina		CM**						
North Dakota			CMS***					
Ohio	CMS*		CMS**1/					
Oklahoma	CMS*	CMS*						
Oregon			CMS*			CMS***		Stat.***
Pennsylvania		CMS*4/						
Rhode Island			M				M	Stat.**
South Carolina								Stat.***
South Dakota		CMS*						
Tennessee							CMS***	Const.***
Texas		CMS**					CMS***	Const.***
Utah		CMS*						Stat.***
Vermont								
Virginia							CM**	
Washington	CMS*3	CMS**	CMS**	S**				Stat.***
West Virginia	CMS*	CMS*						
Wisconsin		CMS*						
Wyoming		CMS*						

C-County M-Municipal S-School District *-Enacted before 1970 **-1970 to 1977 ***-1978 and after
Const.-Constitutional

See notes on next page.

1/ Limits follow reassessment. 2/ Applicable to only New York City and Nassau County. 3/ Only for selected districts (Fire, Library, Cemetery, etc.) 4/ Jurisdictions with home rule charters are not subject to limits. 5/ Expires December 31, 1984.

Source: ACIR, Significant Features of Fiscal Federalism, 1984

Table III Cont'd.

Restrictions on State and Local Government Tax
and Expenditure Powers (October 1984)
(Continued)

Explanation of Column Headings

Overall Property Tax Rate Limit: refers to the maximum rate that may be applied against the assessed value of property without a vote of the local electorate. The rate is usually expressed as millions per dollar of assessed value. The overall limt refers to the aggregate tax rate of all local governments-municipal, county, school districts, and special districts (if applicable).

Specific Property Tax Rate Limit: same as above, except the specific rate limit refers to limits on individual types of local governments (i.e., separate limits for cities, counties, etc.) or limits on narrowly defined services (excluding debt).

Property Tax Levy Limit: refers to the maximum revenue that a jurisdiction can raise from the property tax. This is typically enacted as an allowed annual percentage increase in the property tax levy.

General Revenue Limit: refers to the total amount of revenue, both from property and nonproperty tax sources, that a local government is allowed to collect during a fiscal year.

General Expenditure Limit: refers to the maximum amount that a jurisdiction can either appropriate or spend during a fiscal year. This is usually legislated as an allowed annual percentage increase in operating expenses.

Limits on Assessment Increases: by limiting increases in assessments, taxpayers are protected from escalating tax bills caused by appreciating property values. This forces local governments to increase tax rates for needed additional revenue, rather than rely on this automatic revenue windfall caused by rising property values.

Full Disclosure or Truth-in-Property Taxation: refers to a procedure designed to promote public discussion and political accountability requiring local governing bodies to advertise and hold public hearings on proposed tax rate increases.

(The tax reform act of 1986 severely restricted the use of tax exempt debt for private activities.)

During the volatile period of the late 1970's and early 1980's, investors demanded more financial disclosure, greater security, and a shifting of some of the risks from the investor back to the issuer. These demands present the greatest problems for small communities that are inexperienced in dealing with the private sector in financing. Smaller communities face higher interest rates because of their short or non-existent credit histories. Since the size of their bond issues is likely to be smaller, they must also contend with underwriting and marketing costs which are higher per unit. For these reasons, the small communities have been the focus of state policies in financing assistance.

Some of the most important ways that states aid local governments in financing public works investments are: 1) by giving localities more flexibility to raise local revenues; 2) by enabling allowing creation of local capital improvement districts or authorities; , and 3) by direct assistance. In implementing these programs, states may also want to prevent large (or any) subsidies, prevent adding undue administrative costs, and prevent harming the state's own credit rating.

The National Conference of State Legislatures (NCSL, 1982), has classified direct state assistance programs into five major categories. The categories are 1) supervision and technical assistance, 2) financial intermediation, 3) grants for debt service, 4) guarantee of local debt, and 5) creative financing.

1. Supervision and Technical Assistance. Many states supervise local debt management by collecting and disseminating data, prescribing contents of official statements(i.e. bond prospectuses), or reviewing local bond issues. These activities add to local administrative costs and can restrict local freedom of action, but state supervision also improves credit quality state-wide by providing sound financial information to the financial community and reducing the risk of default. Many states also provide technical assistance to their local governments, such as by providing data to bond issuers, publishing manuals, or conducting seminars. These activities enhance the technical skills of local officials and facilitate responsible debt management (NCSL, 1982).

States have been involved in local debt management for a long time. Some of the most extensive programs were initiated during the 1930's when many cities felt the effects of the Depression and approached default. Interest in these efforts peaked again in the last few years as the number of cities under financial stress and the use of tax-exempt bond financing grew. North Carolina and New Jersey have the two most extensive assistance, oversight and financial management regulation programs in the country. (See Interstate Conference on Water

Problems/U.S. Army Corps of Engineers (1985) for discussion of North Carolina's program.)

2. Financial Intermediation. This term refers to intermediation between local governments and the credit market. Financial intermediaries, such as a state agency or authority that issues debt and loans the proceeds to local governments, reduce the borrowing costs of local governments (because of the states' better credit ratings), provide access to the credit market for new or infrequent issuers, and reduce underwriting and marketing costs. This category also includes state loan programs funded from current revenues, which share many of the features of true financial intermediaries except that they are not funded solely by state bond issues. (NCSL, 1982)

Five states (Alaska, Maine, North Dakota, New Hampshire, Vermont) operate bond banks that provide a voluntary service to issuers of local debt. Only in North Dakota are the bonds backed by the full faith and credit of the state, which may be a disadvantage in that the state's own credit rating may be reduced by the issuance of a large volume of state bonds for local purposes.

> "The Maine Bond Bank is a good example of how bond banks operate. The bank was established by the state legislature in 1972. It operates at no cost to the state; all expenses are paid by participating municipalities".
>
> "The bank sells bonds in issues of $6 million or more and uses the proceeds to purchase an aggregation of smaller, general obligation bonds issued by municipalities. This procedure reduces the costs of bond underwriting and marketing, and significantly lowers the interest payments.
>
> "The bonds sold by the bank are secured by a reserve fund, by the full faith and credit of municipalities, a lien on state grants- in-aid, and as a last resort, the state's moral obligation. The bonds are not secured by the state's full faith and credit. And the bank can exclude local issues that could detract from the marketability of the bank's bonds.
>
> "Participation by the municipalities is voluntary. Local governments wishing to sell bonds to the bond bank must first receive the unusual electoral approval (if necessary). They then provide the bank with the financial information usually requested by credit rating agencies. After the bank buys the bonds, the municipalities' interest rates are equivalent to those obtained by the bank itself." (NCSL, 1982).

Economies of scale are achieved in bond banks by pooling issues, which reduces unit costs for underwriting, financial advice, bond notice, bond prospectus, bond printing and rating.

Costs that remain unchanged are those for special elections, local attorneys fees, and outside bond counsel. Katzman has found that a bond bank reduces the localities' interest rate by 38 basis points (interest rate reduction of .38%) (NCSL, 1982). Bond banks are most valuable in states where there are many small, poorly rated, or infrequent issuers and there are significant differences between state and local credit ratings. A very critical view of bond banks, however, is given by Smith (1984):

> "By pledging - explicitly or implicitly - the taxing power of the state, bond banks transfer financing risk from local to state governments. This reduces financing costs of local governments. But it increases the financing costs of state governments, because they do not have unlimited financial capacity to assume the financial risks of local governmental investment."

Some states operate revolving loan programs or "infrastructure banks" for specific purposes such as water development or sewer facilities. Like a bond bank, an infrastructure bank redistributes financing costs among municipalities and between state and local governments. However, loan repayment requirements provide municipalities with greater incentives to economize on project resources than outright grants.

3. Grants for Debt Service. Several states earmark their state aid payments for local debt service, usually school construction. The state aid may be sent to the locality or directly to the bond holder. This procedure reduces the investor's perceived risk, and thus lowers the locality's interest payments. (NCSL, 1982).

4. Guarantee of Local Debt. Four states promise to supplement or replace local resources as may be required to meet debt service payments (for limited purposes). These programs may lower perceived risks (and reduce interest payments), but can also weaken state credit ratings. (NCSL, 1982).

A better alternative may be the use of private bond insurance. If an offering has been insured, it receives a rating the same as that of the insurer. Studies have shown bond insurance to be cost effective, especially for the smaller, lower-rated municipalities.

5. Creative Financing. States can enact legislation to enable their localities to utilize new financing instruments, and provide technical assistance to ensure proper use. These instruments include zero-coupon bonds, sale-leaseback financing, and other techniques suited to the complexities and investor demands of the credit market. (NCSL, 1982).

State/Substate Water Resources Planning Capabilities

The technical capabilities of states in water resource planning and engineering are diverse. Many states and local governments have relied solely on the Federal government for these services. As might be expected, the most well-developed programs are in states where water-related problems are urgent and there are adequate monetary resources In general, the broader the mandate given a state agency, the more likely it is that its staff would have the capability to participate in the planning and design of a Civil Works project.

Table IV summarizes the findings of the Water Resources Council (WRC, 1981) regarding states' water resources planning efforts. The WRC found that thirty-five states have express legislative or administrative authority for some type of comprehensive water resources planning. Among these thirty-five states Delaware, Florida, and Washington have statutes calling for comprehensive, single-agency control of the planning and management of state water and related land resources. Thirteen states have comprehensive water quality and quantity planning that are integrated into a single lead agency but without control of related lands and fewer management responsibilities. Eight states have responsibility for water quantity planning and management only with no water quality responsibilities. Eleven states plan for water quantity as a wholly separate function from water management and from quality programs. Fifteen states do not have water resource planning programs that fit into these groupings.

Twenty-two states with comprehensive water quantity planning have a mandate to do so continuously. Eight states have "one-shot" comprehensive water quantity planning. At least ten states include water resources planning as part of their overall natural resources plan.

The WRC found that "western States have tended to integrate water quantity planning and management functions in a single agency. Northeastern States, on the other hand, have been more apt than others to integrate water quality and water quantity planning functions in a single agency." Furthermore, for the nation as a whole, water quality planning and management has generally been more likely to receive comprehensive treatment at the state level than quantity concerns. One of the main reasons for this is that a large amount of river basin quantity planning has been done by the Federal agencies. Quality programs, on the other hand, have been structured to complement the Federal program.

A survey was undertaken of the professional capabilities of the states in comprehensive water resource planning. The results of the survey are shown in Table V.

Eighteen states have a state water plan that makes project-

Table IV

Water Resources Planning and Management Matrix

	34 STATES HAVE EXPRESS LEGISLATIVE OR ADMINISTRATIVE AUTHORITY TO IMPLEMENT COMPREHENSIVE WATER RESOURCES PLANNING				THE NATURE OF THE WATER RESOURCE PLANNING EFFORT		
	A Single Agency Control of Planning and Management State Water & Related Land Resources	B Comprehensive Water Quality Planning and Quantity in Single Lead Agency	C Comprehensive Water Quantity Planning and Management In One Agency	D Water Quantity Planning only: Management and Quality Functions Separate	E Continuous Comprehensive Water Quantity Planning	F Static One-Shot Comprehensive Water Quantity Planning	G Planning is Element of Natural Resources Program
	3	13	6	11	22	8	10
ALABAMA							X
ALASKA							X
ARIZONA		X			X		
ARKANSAS				X		X	
CALIFORNIA				X	X		
COLORADO				X	X		
CONNECTICUT		X			X		
DELAWARE	X				X		
FLORIDA	X				X		
GEORGIA		X					
HAWAII				X			X
IDAHO			X		X		
ILLINOIS							
INDIANA				X	X		
IOWA			X			X	
KANSAS		X			X		
KENTUCKY							
LOUISIANA							
MAINE							X
MARYLAND			X		X		
MASSACHUSETTS				X			
MICHIGAN							
MINNESOTA			X			X	
MISSISSIPPI							
MISSOURI		X				X	
MONTANA			X		X		
NEBRASKA				X		X	
NEVADA		X				X	
NEW HAMPSHIRE							X
NEW JERSEY							X
NEW MEXICO							X

Table IV Cont'd.

	34 STATES HAVE EXPRESS LEGISLATIVE OR ADMINISTRATIVE AUTHORITY TO IMPLEMENT COMPREHENSIVE WATER RESOURCES PLANNING				THE NATURE OF THE WATER RESOURCE PLANNING EFFORT		
	A Single Agency Control of Planning and Management State Water & Related Land Resources	B Comprehensive Water Quality Planning and Quantity in Single Lead Agency	C Comprehensive Water Quantity Planning and Management In One Agency	D Water Quantity Planning only: Management and Quality Functions Separate	E Continuous Comprehensive Water Quantity Planning	F Static One-Shot Comprehensive Water Quantity Planning	G Planning is Element of Natural Resources Program
NEW YORK		X					X
NORTH CAROLINA					X		
NORTH DAKOTA							
OHIO							
OKLAHOMA			X		X		
OREGON			X		X		
PENNSYLVANIA		X			X		
RHODE ISLAND							
SOUTH CAROLINA				X		X	
SOUTH DAKOTA							X
TENNESSEE				X	X		
TEXAS[a]		X	X			X	
UTAH				X	X		
VERMONT		X					X
VIRGINIA		X			X		
WASHINGTON	X				X		
WEST VIRGINIA		X			X		
WISCONSIN		X			X		
WYOMING				X	X		

Source: State of the States: Water Resources Planning and Mangement, Water Resources Council, Sept. 1981.

[a]Texas Agencies fit in both categories.

specific recommendations. Seven of these (Alaska, Maine, New Hampshire, New Jersey, North Dakota, Ohio, and South Dakota) are not among the WRC's thirty-five states noted for some type of comprehensive planning; only eleven states have some type of comprehensive planning that also makes project-specific recommendations. States with the most urgent water quantity problems have developed the most professional basin-wide planning capabilities, but, like other states, still rely on the Federal government as a primary source of technical expertise.

Five more states are in the process of preparing a major state water plan. Many others do comprehensive project specific planning using a regional or basin-wide approach. How well any of these state efforts translate into project implementation varies. Some state water plans, like New Jersey's, are the basis for state programs or appropriations.

An assessment of a state's professional capability should also include assessment of the resources at the local or regional level. There are at least five states with medium to large state-level professional planning staffs which have institutionalized substate regional authorities with substantial planning capabilities of their own: California, Florida, Nebraska, Texas, and Ohio. Many other individual municipalities, large suburban areas, or special districts have extensive professional capabilities.

Table V

State Water Planning Capabilities and Financing Authorities

	A NUMBER OF WATER RESOURCE PLANNERS & ENGINEERS	B APPROX. BUDGET COLUMN 1	C IS THERE A STATE WATER PLAN?	D DOES THE PLAN MAKE PROJECT/ PROGRAM SPECIFIC RECOMMENDATIONS	E SUBSTATE REGIONAL WATER AUTHORITIES	F CAN AUTHORITIES ISSUE BONDS?	G DO AUTHORITIES HAVE ANY POWER OF TAXATION?	H PROFESSIONAL CAPABILITIES TO JOINTLY PLAN PROJECTS?	I OTHER REMARKS
ALABAMA	4 (oversee contractors)	~$300K	no	N/A	none				
ALASKA	11-12 total -3 hydrologists -2 engineers -6 technicians	~ $2 million	5-year appraisals updated annually, land-use oriented, regional planning emphasis also	yes, extensive cooperation with U.S.G.S.	none				
ARIZONA	~ 25	~ $2 million	yes, emphasis on groundwater regulation and conservation	yes, water conservation rules & regs	Flood Control Districts -each county has one	yes, revenue bonds	yes	a few districts can, most use state and consulting services	
ARKANSAS	~ 4 plus IPA help	~$100K	yes, 1975 version being revised now	presents problems & potential solutions	1.Regional Water Distribution Districts 2.Levy&Drainage Watershed Improvement Districts	yes, revenue bonds yes, limited by property tax caps	no yes	no, state would work in their behalf	State has 3 financial assistance programs, one is Water Development Fund, state has authorization to issue $100 million in G.O. bonds
CALIFORNIA	Over 500 in Dept. of Water Resources	~$300 million per year	yes, $30 mill/ per yr. for plan	yes	Reclamation & Special Districts	some	yes	In a few instances, State is advisor to local governments	$550M project construction budget, $100M flood control, $10M other planning

Table V Cont'd.

	A NUMBER OF WATER RESOURCE PLANNERS & ENGINEERS	B APPROX. BUDGET COLUMN 1	C IS THERE A STATE WATER PLAN?	D DOES THE PLAN MAKE PROJECT/ PROGRAM SPECIFIC RECOMMENDATIONS	E SUBSTATE REGIONAL WATER AUTHORITIES	F CAN AUTHORITIES ISSUE BONDS?	G DO AUTH-ORITIES HAVE ANY POWER OF TAXATION?	H PROFESSIONAL CAPABILITIES TO JOINTLY PLAN PROJECTS?	I OTHER REMARKS
COLORADO	8	~$500K	no	N/A	Conservancy Districts	yes	yes	About 4 or 5 Conservancy Districts have capability	
CONNECTICUT	7-10	~$325K	now being prepared, policy-oriented	some	Flood & Erosion Control Boards -appointed by Town Council -plans must be voted on by public	no, financing must be done through Town Councils	no	no	State takes lead on all flood control projects, water supply through Dept. of Health Services
DELAWARE	10 geohydrologists 6 environmental scientists	~$450K	no, framework policy document	N/A	Newcastle County Water Resources Agency (only one in 3 Delaware counties)	no	no	yes, set up for technical assistance, 4-5 professionals	county agency part of overall state planning
FLORIDA	~20		no, done in each District, there is a State Comprehensive Planning Process with little funding	N/A	5 water management districts, each with great autonomy	yes	yes		several fees and taxes are levied to raise revenues for water-related project financing
GEORGIA	6	~$230K for Water Resources Branch of the DNR	no, publish management strategy (1980)	mgmt, strategy does make some	none				GA constitution gives all zoning & land use authority to local governments
HAWAII	25	~$1 mill for Divis.	yes, within Hawaii State Plan Water Resource Development is one of twelve subplans	yes, annually	none				

Table V Cont'd.

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ILLINOIS	~25 (also 25 technicians)	Total Dept. budget is $9.6 mil. $1.2 million planning Budget	no, there is a policy document (1985)	N/A	1.River Conservancy Districts (RCD), 2.Special Assessment Districts	RCDs, unlimited revenue bonding authority, special districts have limited G.O. authority, % assessed valuation	no special districts have small	no, typically consultants are used	state mapping capability is especially good
INDIANA	~90 profs. in state Division of Water, including technicians	div. ~$3.9 mil for FY86	no, legislation now requiring water resource inventory & assessment	N/A	Conservancy Districts organized by courts in consultation with Division of Water	yes	yes	limited	
IOWA	~10 in Dept. of Soil Conservation ~15 in Water, Air & Waste Mgmt.		no, framework policy document	N/A	authorization for River Basin Conservancy Districts	no	no	no	
KANSAS	16 profs. no engineers	~800K	yes, annual update	1985 version will, currently is high priority	Watershed Districts-Hydrologic Conservation Districts-County Groudwater Management Districts	yes, it is rare occurance however	yes	no	have been "totally dependent" on federal Government for engineering services
KENTUCKY	9 engineers 12 technicians	~700K	no, framework document	N/A					

Table V Cont'd.

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LOUISIANA	~9 total in WR Section of Office of Public Works (OPW), others in various agencies	~250K Total Budget Water Resources Section of OPW DOT & Development	no, but 1984 Water Resources Study, policy or framework document, working on plan	no	1.Sabine River Authority	yes, revenue	no, authority to collect fees	no	There are also Waterworks Districts (which can issue bonds and levy taxes) and Drainage Districts (which can levy an acreage tax). Technical Support is given to locals by the OPW.
					2.Water Conservation, Watershed, and Recreation Districts		special property taxes	no	
					3.Levee Districts		yes	no	
					4.Irrigation Districts	yes, revenue	yes	no	
					5.Capital Area Groundwater Conservation District		user charges authorization	no	
MAINE	3 (all planners)	~$150K	yes, basically groundwater strategy policy document	yes	1.Watershed Districts	no	no	no, state assistance or consultants used	intergovernmental agreements are difficult, public hearing requirements
					2.Lake Associations	no	no		
					3.Public Utilities	yes, revenue	no		
MARYLAND	~6	~200K	no, informal periodic report on issues and problems	regional plans make specific recommendations					
MASSACHUSETTS	~26		no, policy document	N/A	1.Water Districts,	yes	as allowed by affected communities	only the Metropolitan Water Resource Authority (Boston)	
					2.Water Resources Authorities (3)	yes as allowed by affected communities			

Table V Cont'd.

	A NUMBER OF WATER RESOURCE PLANNERS & ENGINEERS	B APPROX. BUDGET COLUMN 1	C IS THERE A STATE WATER PLAN?	D DOES THE PLAN MAKE PROJECT/ PROGRAM . SPECIFIC RECOMMENDATIONS	E SUBSTATE REGIONAL WATER AUTHORITIES	F CAN AUTHORITIES ISSUE BONDS?	G DO AUTH-ORITIES HAVE ANY POWER OF TAXATION?	H PROFESSIONAL CAPABILITIES TO JOINTLY PLAN PROJECTS?	I OTHER REMARKS
MICHIGAN	~56 in Engineer-ing-Water Management Division of state DNR	~$3.5 million for profes-sional staff	no	N/A	Local River Man-agement Act makes provisions for Watershed Councils	no	no	South East Michigan Council of Governments has some tech-nical capabil-ities, rely on federal assistance	
MINNESOTA	~45 almost all of these are in regulatory functions		no, framework, policy document	N/A	Soil & Water Conservation Districts	no	yes	Very few districts have any professional staff	"need train-ing in Federa planning process"
MISSISISPPI	17 (including techni-cians)	~$1 million	no	N/A	Water Management Districts	yes, revenue only	no	no, usually require state assistance	
MISSOURI	~12 profes-sionals	~451K	no	N/A	1.Levy Districts 2.Drainage Districts	no no	yes no	no no	Resistance t land use pla ning zoning, only around large cit.es is there any planning
MONTANA	15	~400-500K	no, regional plans	some in regional plans	1.Irrigation Districts 2.Conservation Districts 3.County Water Districts 4.Conservancy Districts	users only yes, mostly revenue yes, G.O. on books, not used	yes yes yes	yes, some capability	local gov'ts are getting from state more than is called for in proposed Fed. cost-sharing policy

Table V Cont'd.

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NEBRASKA	16 profs in Natural Resources Commission	~690K	no, framework document	document makes program recommendations, of 118 recom., 30 have been adopted	Natural Resource Districts, 134 total employees in 24 districts, ~65% are professionals including technicians	yes, revenue	yes, they have a limited millage rate	the financial resources of the Districts varies dramatically from region to region	a problem has been the inability to encumber future legislatures for O&M costs
NEVADA	21	~$1 million for Div. of Water Resources	yes, but it is old	some					
NEW HAMPSHIRE	9 Water Resources Board	~400K	yes, Water Resources Management Plan (1985)	yes	Village Districts	yes	yes	yes	Village Districts can be formed for the purpose of impoundment of water
NEW JERSEY	over 100 engineers & planners spread over many branches	state has $350 million water supply bond issue	yes, Master Plan for water	yes, for projects to be funded with a bond issue it must be in Master Plan	North Jersey Water Supply Commission - state agency with regional focus	yes-revenue bonds	no	yes	state has numerous autonomous communities, very decentralized authority
NEW MEXICO	~95 total office	$1.3	no						
NEW YORK	~30 in Bureau of WR, Bureau of Flood Protection	~$1.5 million	no, working on management strategy due in 1987, regional studies	no	Hudson River-Black River Regulating District	yes	yes	yes, have some capability	no more districts like this are seen for the future

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NORTH CAROLINA	~15, Office of Water Resources	~450K	no, framework study in 70s, regional studies						Very wide array of inter-governmental arrangements are available to localities, strong financial oversight and bonding assistance
NORTH DAKOTA	~15	~600K	yes, 1983	yes	Water Management Districts	no	yes, 4 mils per $1 of assessed valuation	most do not, State has field offices for technical assistance	Water Resources Trust Fund is funded by oil, gas, and coal revenues
OHIO	~5 profs. 1 engineer 4 planners	~200K	yes, 5 regions	yes	1.Conservancy Distrcts 2.Soil & Water Conservation Districts (ea. county)	yes no	yes no	yes (assess benefits) no	Technical staffs of Conservancy Districts varies
OKLAHOMA	~9	~950K for Planning Div. of OK Water Resources Board	yes	yes	1.10 Substate Planning Districts 2.Red-Ark Water Development Authority 3.Grand River Dam Authority	no yes, revenue yes, revenue	no no no	yes no yes	major issue is the east-west transfer of water
OREGON	6 in traditional planning many in other regulatory functions	~$480K	no, basin-wide programs	basin-wide yes	numerous Special Districts	yes, revenue only	yes	no	state uses G.O. bonds to raise money for local water projects

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PENNSYLVANIA	~30 prof. in planning state water projects	~$1.6M million	yes, 22 volumes	yes	County & Municipal Authorities	yes, revenue	no	no, state personnel would be reassigned to Fed. projects	
RHODE ISLAND	4	~$250K	no	N/A					
SOUTH CAROLINA	~45	$2.5 million total for Water Resources Commission	no, annually updated policy document	sometimes specific projects are in report if there is to be a bond issue			Joint governmental taxation subject to referendum	no	state cannot commit future years funds
SOUTH DAKOTA	~10-12	~400K	yes	yes	1.Water Development District(6) 2.Water User Districts -Watershed -Irrigation	no yes	not directly* yes	yes no	*Water Development Districts can't contract for projects, they are governed by elected representatives
TENNESSEE	1 state water resource planner		no, but starting one, currently basin-wide planning	working on plan that will make specific recommendations	Obion-Forked Deer River Basin Authority-(only authority outside Tenn. River Basin, acts as sponsor for Federal projects)	yes, G.O. through state agencies	no, funded through legislative appropriations	no	other river authorities cooperate with TVA

Table V Cont'd.

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TEXAS	~12-15 statewide planners	~$1.5 million for Plan. Div.	yes	yes	1.River Authori-ities 2.Municipal Water Districts 3.Conservation Districts	yes, revenue yes yes	no yes yes	yes some do some do	River Author-ities have great autono-my over river basin develop-ment, some ha a great deal technical ex-pertise, 29 substate entites in Texas-15 of which have extremely active programs
UTAH	16, Div. of Water Resources	~$750K	In the process of developing plan, it will be continuous	It will	1.Water Conser-vancy Districts -Single County -Multi-County 2.Water Improve-ment Districts 3.Special Service Districts	yes yes, revenue yes, revenue	yes, 2 mil. per de-velopment no no	no	
VERMONT	10-12	$6 million entire Dept. Budget	yes	yes	none				
VIRGINIA	20-24 of 30 on Water Con-trol Board are in water supply planning	~1.1 million project needs to 2030	no, Water Supply Planning Program 5 year study ending in 1987,	the 5-yr. Water Supply Study will make recom.	none				

Table V Cont'd.

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WASHINGTON	10 planners 8 project assistance engineers	~550K	no, report to legislature, framework, policy position	N/A	1.Irrigation Districts 2.Reclamation Districts 3.Public Utility Districts (PUD)	yes yes yes, revenue	yes yes	some PUDs have technical capability	referendum required for issuance of G.O. debt
WEST VIRGINIA	~7	~400K	no, framework within state Natural Resource Plan	N/A	Statewide Water Development Authority (low cost loans, grants)	yes, revenue	no	no	Authority is just beginning to become involved in water supply area
WISCONSIN	~20	~500K	no	N/A	Wisc. Valley Public Improvement Corporation PUDs-for special purposes, petition, public hearings	yes	yes	no	DNR has broad authority over water, water is in public trust
WYOMING	7-8 Water Commission 10 State Engnrs Of. 3-4 Dept. Econ. Planning & Development	$400K-St. Engnr's Office	no	WWDC-draws up very specific plans	1.Irrigation Districts 2.Watershed Improvement Districts	yes yes	yes yes	no no	

SOURCE: Interviews with state water resource officials.

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STUDY OF NONFEDERAL INSTITUTIONAL ARRANGEMENTS AND PRACTICES FOR PROJECT PLANNING AND FINANCING
Contract DACW72-84-C-0004
Task Order No. 10

FINAL REPORT
March 1987

Dr. David Moreau and Dr. Neil S. Grigg in Association with
Planning and Management Consultants, Ltd.
808 West Main Street
P.O. Box 927
Carbondale, Illinois 62901
(618) 549-2832

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INTRODUCTION AND PURPOSE

Changes in federal water resource policy, particularly those pertaining to cost-sharing arrangements, have brought about new partnerships among federal, state, and local governments in the planning and financing of water resource projects. These changes, which have been many years in the making, may lead to more economically efficient investments in water resource developments because priority will be given to those projects for which state and local governments are willing to pay a substantial share of the cost. However, planning and financing of these projects will become more complex because of the increased number of decision-making units which must give approval to a project and the variety of financial arrangements which must be concluded prior to construction. While planning and financing of projects when the federal government played a much more dominant role were never seen as simple processes, they become even more complex as state and local governments, with their variety of institutional arrangements and financial practices, take on more important roles in the partnership.

The purpose of this chapter is to provide a general perspective on the kinds of nonfederal institutions that are likely to be sponsors of water resource development projects and to describe how those institutions plan and finance water resource facilities. It is intended for

the water resource planner, engineer, manager, or financier who is interested in a greater understanding of project development processes in nonfederal organizations. The chapter includes a classification of nonfederal water management institutions; a discussion of project planning processes used by those organizations; a description of the levels of capital expenditures made by these organizations and how those expenditures are financed; a description of cost-recovery methods that they use; and, finally, a discussion of some of the obstacles that those organizations may face in developing water resource projects.

ORGANIZATIONAL ARRANGEMENTS

Numbers and Types of Units

The sheer number of public water management entities in the United States shows the wide variety of organizations that could be involved in federal water resource projects. Despite the lack of a definite inventory of nonfederal water management organizations, it is possible to establish the approximate range for numbers of such units. For example, a 1976 study counted 2,401 ports in the U.S., almost 1,500 in the private sector and about 900 owned by various units of government as shown in Table 1 (Marcus, 1976). The number of public water suppliers is much larger. A 1983 estimate by the U.S. Environmental Protection Agency (USEPA) put the number of community water supplies at approximately 65,000, distributed by size as shown in Table 2.

No comparable inventory of wastewater management organizations is available. However, USEPA listed some 32,511 "facilities" in their

TABLE 1. NUMBER OF U.S. PORT FACILITIES BY OWNERSHIP, 1976

Type of Ownership	Number
Private for profit	1,488
Private nonprofit	6
Local government	576
State government	288
U.S. government	43
Total	2,401

Source: Marcus, 1976.

TABLE 2. WATER SUPPLY SYSTEMS IN THE UNITED STATES

Size of System		No. of Systems	Percent of Population Served
Descriptor	Population Served		
Very large	> 100,000	277	44.0
Large	10,001 - 100,000	2,770	34.3
Medium	3,301 - 10,000	3,943	10.4
Small	501 - 3,300	19,915	8.7
Very small	25 - 500	37,813	2.6

Source: U.S. Environmental Protection Agency, Office of Drinking Water, FY 1983 Status Report, 1983.

1982 needs survey, and it is estimated that there are 30-50,000 "systems" in the U.S. (Grigg, 1986). It is reasonable to expect their sizes are distributed in a manner similar to that for water supplies.

The USEPA estimates include a large number of privately owned systems, including mobile home parks, subdivisions, and other very small systems, as shown in Table 2. Still, the number of public water management organizations is quite large. The 1982 Census of Governments reported the existence of over 25,000 units of local governments in one or more aspects of water management. The largest number of those units was municipalities, with three-fourths of the 19,076 municipalities in the U.S. providing water and wastewater services. Approximately 300 county governments and 650 townships in the U.S. operate their own water supply systems.

In 1982 there were 9,407 independent special purpose districts with one or more water management functions. As shown in Table 3, these functions include waterway ports and terminals, drainage and flood control, irrigation, reclamation, and water supply and wastewater disposal. Entries in that table do not include the very large number of special boards, commissions, and other types of organizations of state and local governments that do not have independent budgetmaking powers.

Only a relative few of these water management organizations are large enough to play significant roles in Corps of Engineers projects that require congressional authorization. Over 80 percent of the residents of municipalities live in the 2,200 cities and towns with populations over 10,000, 66 percent located in the 944 cities with

TABLE 3. NUMBER AND FINANCES OF SPECIAL DISTRICTS - 1982
(Expenditures in $millions)

	SINGLE FUNCTION DISTRICTS				
	Transport & Ports	Drain-age	Flood Control	Irriga-tion	Recla-mation
All Districts:					
Number	168	2098	598	861	132
Expenditures	369.07	95.47	128.58	360.77	20.49
Average	2.197	0.046	0.215	0.419	0.155
Districts With Major Financial Activity:					
Number	26	8	11	39	4
% of total	15.5	0.4	1.8	4.5	3.0
Expenditures	315.68	50.78	78.43	215.30	4.63
% of total	85.5	53.2	61.0	59.7	22.6
Average	12.142	6.348	7.130	5.521	1.158

	SINGLE FUNCTION DISTRICTS (cont.)	MULTI-FUNCTION DISTRICTS				
	Sewer	Water Supply	Sew&WS	FP&WS	NR&WS	ALL PURPOSES
All Districts:						
Number	1595	2686	1056	36	132	8,322
Expenditures	2346.94	1505.66	733.11	23.70	170.87	7948.76
Average	1.471	0.561	0.694	0.276	1.294	0.955
Districts With Major Financial Activity:						
Number	120	77	66		22	6,787
% of total	7.5	2.9	6.3	0.0	16.7	81.5
Expenditures	2008.13	1078.10	435.55		137.33	8744.34
% of total	85.6	71.6	59.4	0.0	80.4	110.0
Average	16.735	14.001	6.599		6.242	1.288

Sew&WS = Sewerage and Water Supply
FP&WS = Flood protection and Water Supply
NR&WS = Natural Resource and Water Supply

populations over 25,000. Furthermore, as shown in Table 3, only 347 of the special districts are classified by the Census as having "Major Financial Activity," defined as those with at least $3 million in annual expenditures or at least $10 million in outstanding debt. Those units spend 74 percent of all expenditures by special districts in water management, but they account for less than 4 percent of all such districts.

The case of ports is illustrative. Of over 2,400 ports in the U.S., only 900 are in the public sector and, therefore, eligible for federal cost sharing. Only 26 of the total of 163 special districts in this business in 1982 had major financial activity, but those 26 accounted for 86 percent of all expenditures for transport and terminals by the special districts.

Classification of Organizations

In addition to differentiations by size and purpose, there are at least three other characteristics by which water management organizations can be classified. They are:

(1) the powers delegated to an organization

(2) the level of government that exercises primary influence over an organization

(3) its scope relative to the political boundaries of the unit(s) of government that exercises influence over the organization

These variations are shown schematically in Figure 1.

A fundamental distinction is usually drawn by political scientists between "independent" agencies to which considerable autonomy has been

LEVEL OF GOVERNMENT

STATE

SCOPE	POWERS				
	Dept. of Gen'l Purpose Gov't	Dependent Districts, Commissions or Boards			Independent Districts
		Planning	Operating	Regulatory	

LOCAL

SCOPE	POWERS				
	Dept. of Gen'l Purpose Gov't	Dependent Districts, Commissions or Boards			Independent Districts
		Planning	Operating	Regulatory	
Inter-gov't.					
Co-incident					
Sub-division					

FIGURE 1. CLASSIFICATION OF ORGANIZATIONS BY POWERS, SCOPE, AND LEVEL OF GOVERNMENT

delegated and "dependent" agencies that are so closely tied to a parent unit that they are considered to be an extension of that parent. The Census Bureau uses a similar distinction in classifying agencies, namely independent special districts and subordinate agencies. Most governments of general jurisdictions have executive departments that manage at least one aspect of water resources. Those departments are clearly subordinate to and exercise power through the administrative and legislative branches of the government of which they are a part. Many governments of general jurisdiction also have the power to create special commissions, boards, and other semiautonomous organizations for managing some aspect of water resources as well as other functions, but many of those organizations are so intimately related to state, city, or county governments that they are considered by the Census Bureau to be component parts of their parent units of government. For example, the port authorities of Virginia and North Carolina are both classified by the Census Bureau as subordinate agencies of state governments. Although both have the power to levy fees and to issue revenue bonds, they do not have independent budget authority and their members are appointed by the governor (or other designated state officials). At another level, the Harris County (Texas) Flood Control District is governed by the county commissioners.

To be considered as an independent special district by the Census Bureau, an organization must have "substantial autonomy" in administrative and fiscal matters. That distinction must be made with some discretion, but if an organization has the power to set its own budget, incur debt, set rates and charges for its services, and make its own

personnel decisions (subject only to the provisions of enabling legislation and the general statutes), it would qualify as an independent district. Volume 1, Governmental Organization, of the 1982 Census of Governments contains extensive state-by-state information about authorized special districts, a valuable reference for any analysis of water management organizations.

The levels of government are the usual ones of federal, state, and local. The appropriate level for many organizations is obvious. The Texas Water Development Board and the California Department of Water Resources are clearly units of state government. Likewise, water and sewer and public works departments of cities and counties are clearly at the local level. In fact, a large number of the special districts are at the local level, one example being California's port and harbor districts which are established by cities or counties and whose governing boards are either elected or appointed by elected local officials. Some regional organizations, like the Chicago Regional Port District (CRPD), may be difficult to classify because they fall somewhere between state and local levels. The CRPD is a nine-member board, four appointed by the governor and five by the mayor. Florida's water management districts are classified by the Census Bureau as local special districts, but they were created by an act of the state legislature, their boards are all appointed by the governor, and their rules can be rescinded by the executive branch of state government (Webster and Morgan, 1983). Those characteristics make them very close to the state level and quite different for districts that may be created by local governments under enabling state legislation.

Differentiation by scope relative to political boundaries may also be helpful in categorizing the large number of water management agencies. Organizations may be classified as being intergovernmental if they serve multiple jurisdictions, coincidental if their service boundaries are the same as those of a single government of general jurisdiction, or subdivisional if they cover only a portion of a jurisdiction. A good example of an intergovernmental independent special district at the state level is the Delaware River Port Authority, an organization created by special acts of the legislatures of New Jersey and Pennsylvania. Many special districts, on the other hand, may cover only a single jurisdiction or only a part of a jurisdiction. One of the reasons for creating special districts that cover only a subdivision of a government's jurisdiction is to permit the levying of taxes and charges only on the beneficiaries of projects that affect property within that subdivision and not on other taxpayers in the jurisdiction that receive no benefit from the project.

Powers and Governance

Distinctions among these types of planning and management agencies are important to the planning and financing of water resource projects. Executive departments of general governments, such as those of state government, cities, and counties, can exercise (with the approval of their elected governing boards) a wide range of authorities to plan, tax, borrow money, levy fees, and acquire necessary lands for water projects. Special purpose districts, on the other hand, can generally exercise a more limited range of powers. For instance, in many states

special districts have not been delegated the power of eminent domain. In those cases, that power must be obtained on a case-by-case basis from the state government, and the process of acquiring the necessary easements, lands, and rights-of-way can be seriously impeded. Financial options available to special districts may be more limited also; many are not authorized to issue general obligation bonds. Although regional planning agencies may be important in the planning of projects that serve multiple jurisdictions, they are usually without the power to make commitments on capital expenditures.

As a general rule, state and local governments are subject to the authority of elected officials, while the governing boards of special districts are either elected or appointed, depending on the provisions of applicable state statutes. Elected boards tend to be more accountable to the publics they serve, but many localities, confronted by political difficulties in raising adequate revenues to finance needed facilities, have chosen to move their water management functions to more politically insulated appointed boards.

The evolution of ownership and administrative patterns of ports in the U.S. is somewhat unique. The most active period of development of these organizations was during 1900-25 when many were organized as units of municipal government, including the Board of Harbor Commissions of Milwaukee and the Bureau of Port Operations in Philadelphia. Others, such as the Harris County-Houston Ship Channel Navigation District and the Port of Seattle, were organized as public corporations empowered with the authority to levy taxes (American Public Works Association, 1976).

The Census of Governments provides a summary of the enabling legislation for most types of special districts in each state. As such, it is a very convenient first reference, but details of the powers and governance of any particular agency should be found in the enabling legislation, charter, and bylaws for that organization.

PROJECT PLANNING AND PROGRAMMING

A reasonable hypothesis is that the more politically insulated, special purpose water resource organizations are more likely to use formal methods for planning and programming capital projects than general governments where water projects must compete with those in other service sectors, and where there is likely to be a higher degree of public participation in the setting of priorities. Even if that hypothesis is true, however, the form and content of planning processes are quite variable from one unit of government to the next. The federal government has spent several decades developing a set of principles and procedures to bring about some degree of uniformity in water resource planning among its several agencies, and even then, the current version (U.S. Water Resources Council, Principles and Guidelines for the Planning of Water and Related Land Resources) leaves project planners and decision makers with considerable discretion. There is no similar document applicable to state and local water projects which even attempts to set forth the planning objectives and criteria for evaluation. Thus, there is little reason to be surprised that the only threads of consistency among local planning efforts are those derived from the general principles of planning and engineering

professionals and those imposed by federal statues and regulations, most notably the regulations promulgated pursuant to the Clean Water Act and the National Environmental Policy Act.

Despite this lack of formal, generally applicable guidelines, some generalities have emerged. The normal process for project planning would involve multiple-level studies moving from goal setting and comprehensive regional planning to the formulation and evaluation of alternative water resource strategies to plans for the implementation of specific projects. Plans for specific projects would include detailed engineering designs as well as implementation strategies, including project financing and, in some cases, the policies and procedures for operating the system. In practice, however, the political difficulties encountered in project implementation often obscure any resemblance to order in the process, extending it indefinitely and making the outcomes quite uncertain.

Although the objectives and criteria used to guide the formulation and evaluation of plans may not be stated in formal terms, they are most likely to include the following:

(1) Enhancement of economic development and increasing economic efficiency

(2) Environmental quality

(3) Affordability, as indicated by the prices, taxes, and other charges that the consuming public is willing to pay for the services derived from the projects

(4) Financial self-sufficiency and stability of revenues

(5) Equity among those who have the burden of paying for the projects

(6) Compliance with applicable state and federal statutes and regulations

(7) Political acceptability of proposed projects, including the likelihood that necessary permits can be obtained

It is unlikely that local governments will state the objectives and criteria for projects in formal terms with sufficient specificity to unambiguously guide the formulation, evaluation, and selection of a plan. Nonetheless, those objectives, if not stated at the outset, are likely to be implied in the process of seeking support and approval of the projects.

Some local water management organizations do have well-developed planning procedures. Examples of moderate-size units with well-developed procedures include the Urban Drainage and Flood Control District, located in metropolitan Denver, and the DeKalb County Water and Sewer Department, located in the Atlanta metroregion. At the larger scale, the planning and development processes of the California Department of Water Resources and those of the Chicago Metropolitan Sanitary District are well documented.

The size and financial resources of each district or other unit of government are likely to have a substantial influence on its capacity to plan projects and develop sound financial strategies. Although some of the larger units do have their own planning staffs, most nonfederal water management organizations do not. Responsibilities for project planning and development are usually shared among chief executive officers, engineering staffs, and planning staffs if they exist, but there is little available data from which to draw broad generalizations

about the processes used by nonfederal organizations. It is important to understand these processes, but it can only be done with any detail on a case-by-case basis.

In the case of water supply and flood control projects with clearly identifiable local sponsors, the normal case is for the chief engineer or manager to become convinced of the need for a project. The existence of a reconnaissance report or prefeasibility studies is the exception rather than the rule. Federal assistance may be necessary in many of these cases, especially when there are specific federal planning requirements that must be satisfied.

Also, in the case of port and harbor projects, the nonfederal sponsor may not be an organization with planning capabilities. For example, the North Carolina Port Authority operates two ports, one in Wilmington and the other in Morehead City, but the planning and financing for civil works improvements is done through the Division of Water Resources of the North Carolina Department of Natural Resources and Community Development. For smaller port authorities, the probability that planning can be done "in-house" is small.

Further complications may arise because responsibilities for different elements of the water resource development process may be spread among two or more departments of the sponsoring organization. For example, the Denver Water Department, a large and sophisticated organization, has the responsibility for planning and developing water rights, but project planning is the responsibility of the engineering department.

At the heart of the financial planning process is the capital improvement program, including the identification of sources of funds not only for a specific project involving federal funds but for all capital projects to be undertaken by the sponsoring agency over a time horizon into the foreseeable future. The initial list of projects is often stated as a list of "needs" with or without cost estimates. If the costs are not included in the statement of needs, they must be estimated, then set within the context of continuing operation, maintenance, and replacement costs that the sponsor will face, best determined by a projected cash flow analysis showing all projected expenditures, revenues, and any revenue shortfalls. Completion of that analysis requires, of course, that the financial plan be specified. Furthermore, the outcome of the analysis may lead the agency to reconsider some of the assumptions, some of the projects and their timing, and the financing strategy.

An idealized version of the process is diagrammed in Figure 2. The processes actually used by the array of organizations listed earlier vary considerably. In general, larger and more sophisticated organizations have planning staffs to develop the factual basis for the statement of needs. That statement is true whether the organization is a state government, a local government agency, or a special district.

There is little systematic, reliable data from which to determine the extent to which nonfederal water management organizations have developed valid needs assessments and capital improvement programs. Only a few states have developed plans of this kind. Those that have been developed tend to focus on single sectors such as transportation,

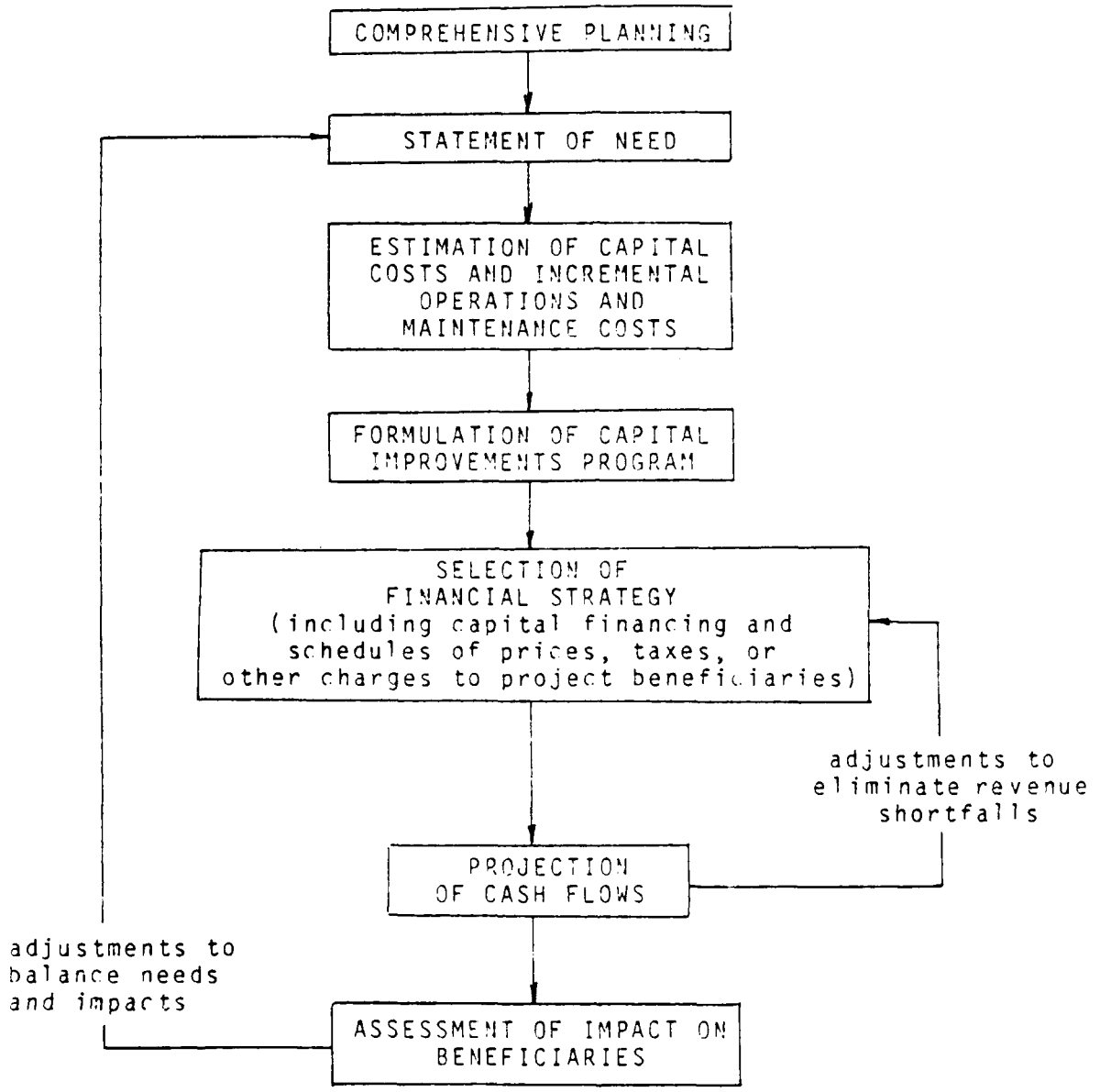

FIGURE 2. ELEMENTS OF THE CAPITAL BUDGETING-FINANCIAL PLANNING PROCESS

wastewater disposal, or schools. Several surveys have been made of capital budgeting practices in cities, but their results are inconsistent. A 1977 study by the American Society of Planning Officials found only 150 cities, out of 1,200 in the survey, that had qualified capital budgets. A more positive outcome was reported in a 1983 survey by the National League of Cities and the U.S. Conference of Mayors, which found that 90 percent of the 809 respondents had capital budgets. A recent analytical study of municipal capital budgeting in cities with populations between 50,000 and 1,000,000 (Jenne, 1985) found that nearly all cities did include construction cost estimates in their planning. Over three-fourths of them used budget constraints in formulating capital improvement programs, but in most instances, those constraints were only tentative guides for planning. Less than half the respondents used sensitivity analysis to evaluate the effects of risk and uncertainty, and even fewer attempted to measure project benefits. Furthermore, Jenne interpreted most of the positive responses to the question of measuring benefits as meaning they estimated project revenues, not economic benefits.

Capital programming and budgeting practices of state governments have been studied several times in recent years. One of the more widely publicized of these studies was conducted as a part of a congressional study of national infrastructure needs (Joint Economic Committee, 1984). That report does not present a very positive picture. Some of the comments that follow are illustrative.

"Responsibility for infrastructure planning, budgeting and management is fragmented. Responsibility is shared between state and local

governments, special districts and private firms. There is, therefore, no reliable data on past investments, future requirements, or revenues." (California)

"There is . . . information . . . through ad hoc planning efforts rather than an institutionalized capital planning and budgeting process . . . the governor has prepared a five-year capital investment budget . . . the legislature dominates the budget process, and until they embrace the concept of capital budgeting, the planning process will have little impact." (Colorado)

"Kentucky is presently pursuing a variety of capital planning initiatives to deal with emerging investment needs. These initiatives are coordinated through a Strategic Planning and Program Analysis (SPPA) process which will result . . . a five-year capital plan for the first time."

"The Maryland Department of State Planning . . . found that the information on capital facilities was poor and that its use in planning was . . . weak."

These comments are typical of state governments. In spite of the fragmentation that impedes coordinated state planning, there are some examples of vigorous state-level coordination efforts, often with assistance in planning and financing. Furthermore, even though there is a need for capital budgeting at the state level, it may be less critical there than at the local level because state governments tend to pay for much of their capital investments from current appropriations.

FINANCING METHODS

That is not the case for all nonfederal water resource agencies. There is considerable variation in how these agencies finance capital projects, variations attributable to differences in authorizing legislation in different states, variations caused by inherent differences in the services provided, and variations due to national and state policy. For example, because there is a strong demand for public

water supplies, because the outputs are vendible, and because the service is affordable to most citizens, water supplies have been financed, for the most part, from revenues generated from the sale of services. On the other hand, the outputs of drainage and flood control projects are not vendible; they have been financed in large part through tax revenues. Wastewater treatment, on the other hand, was judged by the states and the federal government not to be in sufficiently high demand to meet desired levels of environmental quality. To increase the coverage and quality of that service, state and federal governments have provided financial incentives to local governments through grants and loans. Irrigation, originally promoted as part of a national development policy, has relied heavily on cost sharing with the federal government. However, with the changes in federal cost-sharing policies and reductions in federal grant programs, several of these water resource service sectors are shifting to other forms of financing, some innovative and some that are being adapted for new purposes.

There are a wide range of financing alternatives from which to choose, and for purposes of this discussion, it is useful to think of them as being divided into two broad, complementary classes. One group consists of the alternative ways of generating the capital during construction necessary to pay for projects at the time they are built. A sponsor must either (1) use internally generated funds from current revenues or accumulated reserves; (2) borrow the money from others through one of several forms of financing; or (3) pay with funds granted to them from other units of government.

The second group, discussed in the following section, is commonly referred to as "cost-recovery" methods because they include techniques by which the project sponsor can recover the costs from project beneficiaries, if necessary or desirable, over extended periods of time. In more general terms, they are methods for generating revenues. The two groups are complementary because a set of cost-recovery techniques may be used to either generate capital reserves or to repay the debt incurred in financing during construction. The distinction is particularly useful in the light of recent changes in federal cost-sharing policies, because current policies require the nonfederal sponsor to provide their share of the capital during construction. Only in exceptional circumstances is the federal government now offering the nonfederal sponsor the option of paying its share of the cost over extended periods of up to 50 years at below-market interest rates.

The first of these methods, paying from either current revenues or accumulated reserves from own-source revenues, is known as "pay-as-you-go" financing, while the use of borrowed funds is referred to as "pay-as-you-use" financing. Intergovernmental revenue is the technical term used by the Bureau of the Census for those funds that are transferred from one unit of government to another as grants or through other mechanisms. The flows of intergovernmental revenues from the federal and state levels have been important to local government finance over the past 25 years, but they have declined sharply since 1977, especially the categorical grants for water-related projects. Local governments received 30 percent of all of their revenues from federal and state sources in 1962. As shown in Figure 3, that

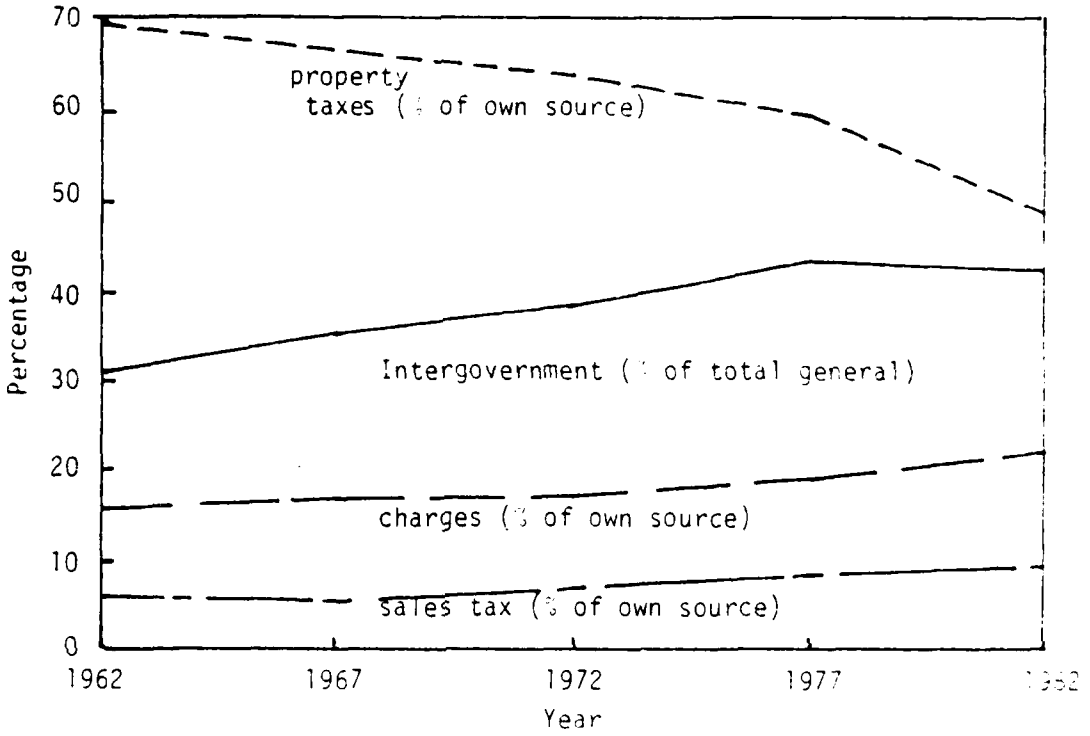

FIGURE 3. TRENDS IN LOCAL GOVERNMENT REVENUES

percentage reached a peak of 42 percent in 1977 but fell to 41 percent in 1982. Changes in these revenues have been even more dramatic for water resource facilities because of the dominant influence of grants for wastewater treatment plants. The next census of government finances in 1987 is most likely to reflect a continuation of the trend toward local self-sufficiency and away from grants for water resource investments.

The Internal-External Balance

Most units of government use some combination of "pay-as-you-go" and "pay-as-you-use" financing to pay for capital facilities, but it is difficult to determine what shares of all expenditures are paid for by these two types of financing. Annual reports on expenditures and the amount of debt issued do not generally show the flow of funds from their original sources and how they will be ultimately spent. Bond proceeds are generally deposited to the accounts of agencies that also include accumulated internally generated capital. Furthermore, money borrowed in any one year through bond sales or other methods is not usually spent in its entirety during the year in which it is borrowed. A detailed accounting of the flow of these funds over multiyear periods would be necessary to accurately estimate the shares of expenditures paid from various sources.

Some insights into the balance between these various sources can be obtained, however, from the cross-sectional data provided by the Census of Governments and other special studies of state and local government finance. The Census data shown in Table 4 for the period 1962-82

TABLE 4. SELECTED ASPECTS OF LOCAL GOVERNMENT FINANCE
(all entires in $million)

	Census Year				
REVENUE	1982	1977	1972	1967	1962
Total General	281,045	179,045	105,243	58,071	38,346
Intergovernmental	116,619	76,831	39,694	20,188	11,642
Own Sources	164,426	102,214	65,549	38,045	26,705
Taxes	103,783	74,852	49,739	29,074	20,993
Property	78,952	60,267	41,620	25,186	18,414
Sales	14,824	8,278	4,263	1,956	1,456
Charges	35,259	19,097	11,068	6,285	4,077
Utilities	28,612	14,300	7,701	5,246	4,026
EXPENDITURES					
Total Direct General	313,365	170,938	106,499	60,274	39,331
Utilities	41,54[illegible]	22,994	9,715	6,106	4,445
Capital Outlay	43,036	2[illegible],14[illegible]	1[illegible],344	1[illegible],[illegible]89	9,577
LONG-TERM DEBT					
Total Outstanding	242,[illegible]	159,63[illegible]	[illegible],556	81,157	55,[illegible]
Total Issued	29,746	21,031	13,609	7,367	6,443

indicates that all local governments issued long-term debt ranging from 62 to 78 percent of annual capital outlays, with the actual amounts being dependent on the cost of money at the time bonds were issued. Thus, these data imply that from 22 to 38 percent of capital needs at the local level have been financed from own-source revenues and grants. Percentages for individual units of governments varied considerably about these values.

Data from the "Capital Financing - 1985" survey of cities, counties, and townships by the International City Management Association (ICMA) provide additional insights into the use of current revenues for capital financing (Valente, 1986). That survey indicated that 52 percent of the respondents used current own-source revenues to finance up to 25 percent of their capital expenditures, 13 percent used current revenues for 25-50 percent of capital expenditures, 9 percent for 50-75 percent, and 26 percent used them for over 75 percent of capital expenditures. These numbers imply that about 40 percent of the total were paid from current revenues.

A special study of the financing of urban water systems (SCM-Martin and Temple, Barker & Sloane, 1981) indicated that agencies providing that particular service relied even more heavily on internally generated capital. For publicly owned systems in that survey, retained earnings and customer assessments provided about two-thirds of the capital, with only 26 percent financed through debt and the remainder coming from grants, transfers, and other sources. While there may be differences in how the percentage of debt financing is calculated in these analyses (differences that might bring the estimates closer

together), it is reasonable to expect that revenue-producing services like public water supplies will rely more on internally generated funds than nonrevenue services like drainage and flood control.

For ports, approximately 30 percent of capital financing is derived from own-source revenues.

Forms of Debt Financing

Because debt financing plays such an important role in state and local government financing of water projects, it deserves special consideration. There are many forms of debt financing, with variations based on (1) the time scales of payback periods; (2) the type of payback security; (3) the structure of repayment schedules; (4) the degree of variability in interest rates; and (5) the options for early redemption or retirement of the debt.

One of the most basic distinctions is between "short-term" and "long-term" financing. Short-term financing may take one of the following forms:

bond anticipation notes (BANs)

tax anticipation notes (TANs)

grant anticipation notes (GANs)

tax-exempt commercial paper

lines of credit

Although the use of short-term financing is important in state and local finance, it is not usually considered a significant factor in the financing of major water resource projects. Short-term instruments are most frequently used to allow the borrowing unit to wait until more

favorable conditions prevail in the market for long-term financing, especially during periods of high interest rates as shown in Figures 4 and 5. Their use as a part of a financing plan can introduce significant risk because it postpones the fixing of long-term financing. Also, in some states, the use of these methods may be limited by statute or conventional practice.

Long-term financing usually takes the form of bonds, although with recent changes in several states, the use of loans from state revolving funds may be an option. Various types of bonds are distinguished in large part by the type of security that is offered by the issuer for the repayment of debt, the most common distinction being drawn between general obligation and revenue bonds. General obligation (GO) bonds are usually less expensive to the borrowing unit because they carry a greater assurance of repayment, and the buyers of those bonds are willing to accept lower interest rates. When a GO bond is issued, the full faith and credit of the community are pledged as collateral, and the elected officials of that community can draw on a wide array of taxing authority and other powers to generate the revenue to meet the debt service. When revenue bonds are issued, however, the only assurance of repayment is the revenue of the issuing unit. In the latter case, the community does not obligate any of its other resources to repay the principal and interest on the bonds. Thus, buyers of these bonds tend to demand an interest rate that is higher than that on GO bonds to compensate them for the added risk.

Because GO bonds are usually cheaper to issue than revenue bonds, it is reasonable to believe that they would dominate the market in

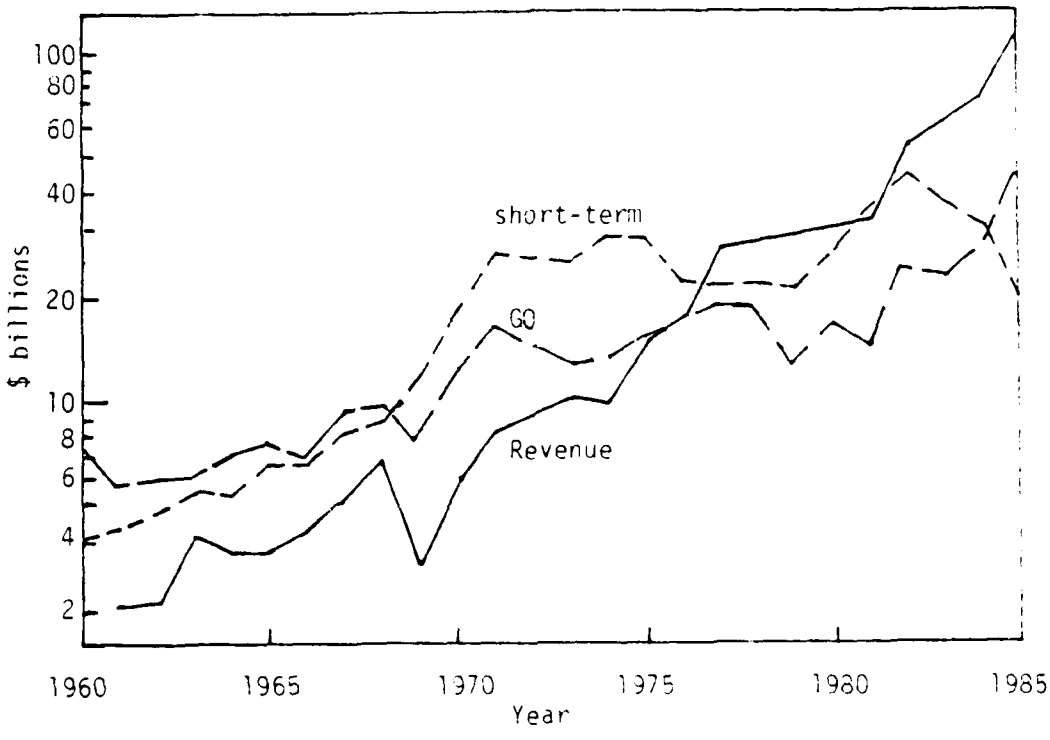

FIGURE 4. VOLUMES OF STATE AND LOCAL BOND ISSUES

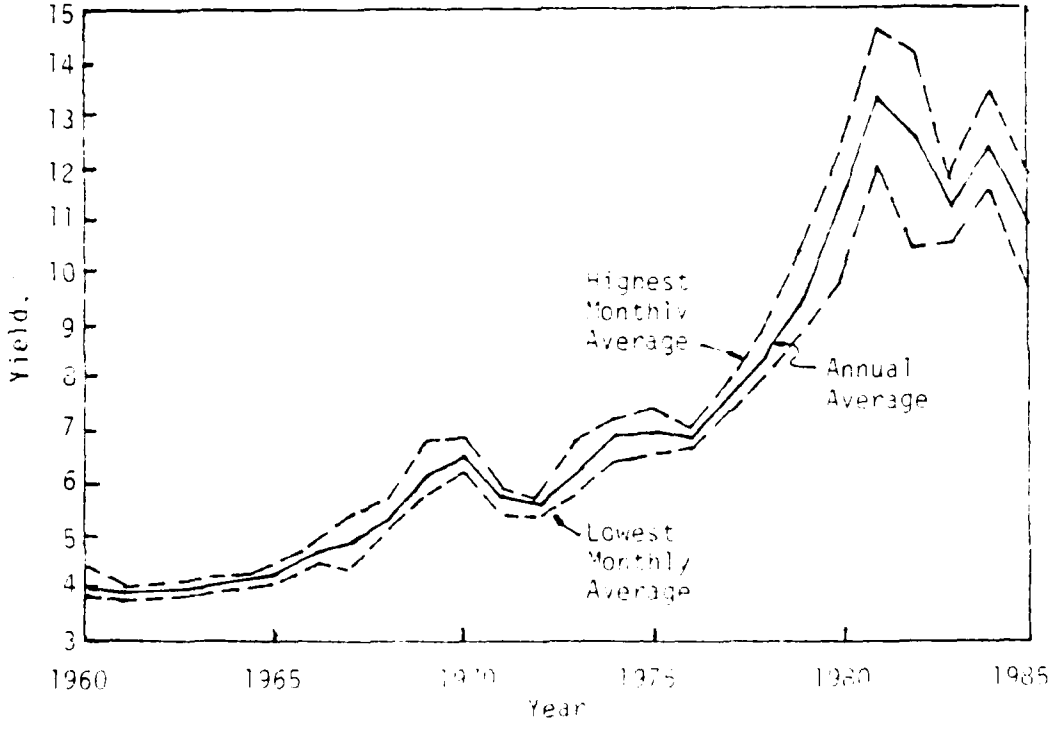

FIGURE 5. MOODY'S GOVERNMENT BOND YIELD AVERAGES

tax-exempt bonds. However, there are disadvantages to GO bonds which have affected their share of the market, especially in recent years. First, before GO bonds can be issued, the issuing unit of government usually requires approval of the electorate through a bond referendum. In some states, such as Virginia, local officials may be permitted to issue a limited amount of bonds each year without approval of the public, but the amount of capital that can be raised in this manner is usually quite limited. Second, most states have statutory limits on the amount of GO debt that may be outstanding at any one time with the limit usually stated as some fraction of the assessed value of property within the jurisdiction of the issuing government. In North Carolina, for instance, that limit is 8 percent of assessed property value. Communities that have reached that limit may be forced to some alternative, and in many instances, local governments will reserve a portion of their remaining bond authority to preserve flexibility in financing future capital needs or for facilities that do not generate revenues.

Thus, as shown in Figure 4, the use of revenue bonds has been increasing rapidly relative to the use of GO bonds. Since 1975 the volume of revenue bonds issued each year has exceeded the volume of GO bonds issued, increasing to a point in 1985 where the volume of revenue bonds was four times that of GO bonds issued in that year. Thus, local governments have shown a willingness to incur extra expense in borrowing with revenue bonds instead of either risking the possibility of [illegible] with the public or using up some or all of their authorized GO

[illegible], the choice between GO and revenue bonds is also [illegible] project that is being financed. Data from

the ICMA survey show that 38 percent of the respondents used revenue bonds to finance water supply projects, while 32 percent used GO bonds. On the other hand, only 23 percent used revenue bonds for wastewater and storm-water projects, while 40 percent used GO bonds (Valente, 1986).

In addition to the type of security offered to support their repayments, bonds may also be differentiated by the time structure of the payment of interest and the repayment of principal. One basic distinction is between term bonds and serial bonds. With a term bond, the issuer makes one lump-sum repayment of the principal to the buyer at the end of a fixed term, say 10 or 20 years; interest on the entire principal is paid each year at a rate determined at the time the bond is issued. Although the buyer is repaid the principal in one lump sum, the issuer may be required, by terms of the bond sale, to pay specified annual amounts into a sinking fund which will earn interest and reach an amount equal to the outstanding principal at the time of maturity. If the amounts paid into the sinking fund plus interest payments are structured in such a manner that the issuer ends up paying a constant annual debt service over the term of the bond, debt service on the bond will be quite similar in appearance to a fixed rate mortgage.

Serial bonds, on the other hand, may be thought of as a series of term bonds with a portion of the bonds maturing in each year of the payback period. That is, in addition to interest payments on the outstanding principal each year, a portion of that principal is retired each year. Because each of the serials in the total issue matures in a different year, the interest or discount rate on those bonds has a time

structure, usually increasing as the maturity period increases. Readily available data do not report the relative volumes of term bonds versus serial bonds, and it is quite common that a single bond issue will be structured as a combination of term and serial bonds. The mixture of types of bonds used in any particular issue simply reflects the best judgment of the issuing agency (with the assistance of financial advisors) as to what is likely to appeal to various segments of the population of bond buyers.

Examples of the makeup of two issues are given in Table 5. In the first, a $10 million revenue issue by the city of Baltimore was structured as a combination of $5.69 million in serials and a $4.31 million 20-year term bond. The serial portion of the issue is to be paid back over 15 years. The second is a $57 million GO issue structured as serials payable over 20 years. Amounts of principal due in each year are shown in the table.

Other choices are also open to the issuer in structuring a particular issue. The issuer may choose to make constant annual payments on the principal, or he may choose to make constant annual payments on principal and interest. The second of these options is more common than the first.

Although they have been used sparingly by local governments (Valente, 1986, p. 8), other variations in the structuring of bonds were introduced in the market in the late 1970s and early 1980s as part of a wave of innovations known as "creative financing." Several of these innovations were designed to lower interest rates on borrowing, then running upward of 13 percent on tax-exempt issues, by shifting a

TABLE 5. SELECTED EXAMPLES OF BOND STRUCTURES

MAYOR AND CITY COUNCIL OF BALTIMORE
$10,000,000 REVENUE BONDS (WATER PROJECTS) SERIES 1983-A

The Series 1983-A Bonds are special obligations of the Mayor and City Council of Baltimore (the "City"), the proceeds of which will be used to finance a portion of the cost of the Capital Improvement Program of the City's Water Utility, to refund certain obligations of the City, to fund certain reserves and to pay financing costs. Except to the extent payable from moneys held in the Debt Service Reserve Fund, unexpended Series 1983-A Bond proceeds or other legally available funds, the principal of, premium (if any) and interest on the Series 1983-A Bonds are payable solely from Pledged Revenues of the Utility (as defined in the Administrative Resolution of the Board of Finance of the City, pursuant to which the Series 1983-A Bonds are issued).

The Series 1983-A Bonds are limited obligations of the City and neither the faith and credit nor the taxing power of the City or of the State of Maryland or of any other political subdivision thereof is pledged to the payment of the principal of or the interest on the Series 1983-A Bonds.

$5,690,000 Serial Bonds

Amount	Due	Interest Rate	Amount	Due	Interest Rate
$220,000	1984	5.00%	$380,000	1992	8.70%
230,000	1985	5.75	410,000	1993	8.90
245,000	1986	6.25	445,000	1994	9.10
260,000	1987	6.75	490,000	1995	9.30
280,000	1988	7.25	535,000	1996	9.50
300,000	1989	7.75	585,000	1997	9.75
320,000	1990	8.25	640,000	1998	10.00
350,000	1991	8.50			

$4,310,000 10.125% Term Bonds Due July 1, 2003
Price of All Series 1983-A Bonds: 100%

WASHINGTON SUBURBAN SANITARY COMMISSION, MARYLAND
(Montgomery and Prince Georges County, Maryland)
$57,000,000 WATER AND SEWER BONDS SERIES 1985-A

The Bonds are payable from unlimited ad valorem taxes upon all the assessable property within the District.

$35,000,000 Water Supply Bonds of 1985				$22,000,000 Sewage Disposal Bonds of 1985			
Maturity January 1,	Amounts (000)	Interest Rate*	Yield or Price*	Maturity January 1,	Amounts (000)	Interest Rate*	Yield or Price*
1986	$1,840	9.10%	N.R.	1986	$1,155	9.10%	N.R.
1987	1,840	9.10	6.00%	1987	1,155	9.10	6.00%
1988	1,840	9.10	6.50	1988	1,155	9.10	6.50
1989	1,840	9.10	7.00	1989	1,155	9.10	7.00
1990	1,840	9.10	7.40	1990	1,155	9.10	7.40
1991	1,840	9.10	7.60	1991	1,155	9.10	7.60
1992	1,840	9.10	7.80	1992	1,155	9.10	7.80
1993	1,840	9.10	8.00	1993	1,155	9.10	8.00
1994	1,840	8.10	100	1994	1,160	8.10	100
1995	1,840	8.30	100	1995	1,160	8.30	100
1996	1,840	8.50	100	1996	1,160	8.50	100
1997	1,845	8.70	100	1997	1,160	8.70	100
1998	1,845	8.80	100	1998	1,160	8.80	100
1999	1,845	8.90	100	1999	1,160	8.90	100
2000	1,845	8.50	9.00	2000	1,160	8.50	9.00
2001	1,845	8.10	9.05	2001	1,160	8.10	9.05
2002	1,845	8.10	9.10	2002	1,160	8.10	9.10
2003	1,845	8.10	9.15	2003	1,160	8.10	9.15
2004	1,845	8.10	9.20	2004	1,160	8.10	9.20

(Accrued interest to be added from January 1, 1985)

* The rates shown above are the rates payable by the District resulting from the successful bid for the Bonds on January 9, 1985 by a group of banks and investment banking firms. The successful bidders have furnished to the Commission the initial public offering prices or yields as shown above.

greater burden of risk to the issuer, providing for the earlier payback of funds to reduce the risk of default, or by exploiting more fully the features of the federal income tax code. One example is variable rate bonds where interest rates are allowed to change over the maturity period in response to changes in the market. Another is zero coupon or deep-discount original issue bonds which are term bonds that pay no annual interest to the buyer. The bonds are purchased at prices far below their par value (the face amount to be paid at the end of the term). At maturity the buyer receives a lump sum equal to the par value.

The process of structuring an issue and bringing it to market, as illustrated in Figure 6, can be an important element in water resource planning and decision making at the local level. If a local government is to use bonds in the financing of water projects, it may be advisable to begin this activity early in the planning process.

Bonds may be sold in one of two ways, by competitive bid or by negotiation, and the manner in which they are sold can vary from state to state depending on applicable state statutes. If bonds are to be sold through competitive bidding, the local government would normally employ the services of a financial advisor in selecting the appropriate type of bonds, preparing the necessary documentation, and guiding the staff of the agency through the appropriate steps. If they are sold by negotiation, the underwriting investment bankers will normally provide that service. Several states, including Idaho, Kentucky, North Carolina, and Oregon, have established municipal debt advisory services which also provide guidance to local units of government.

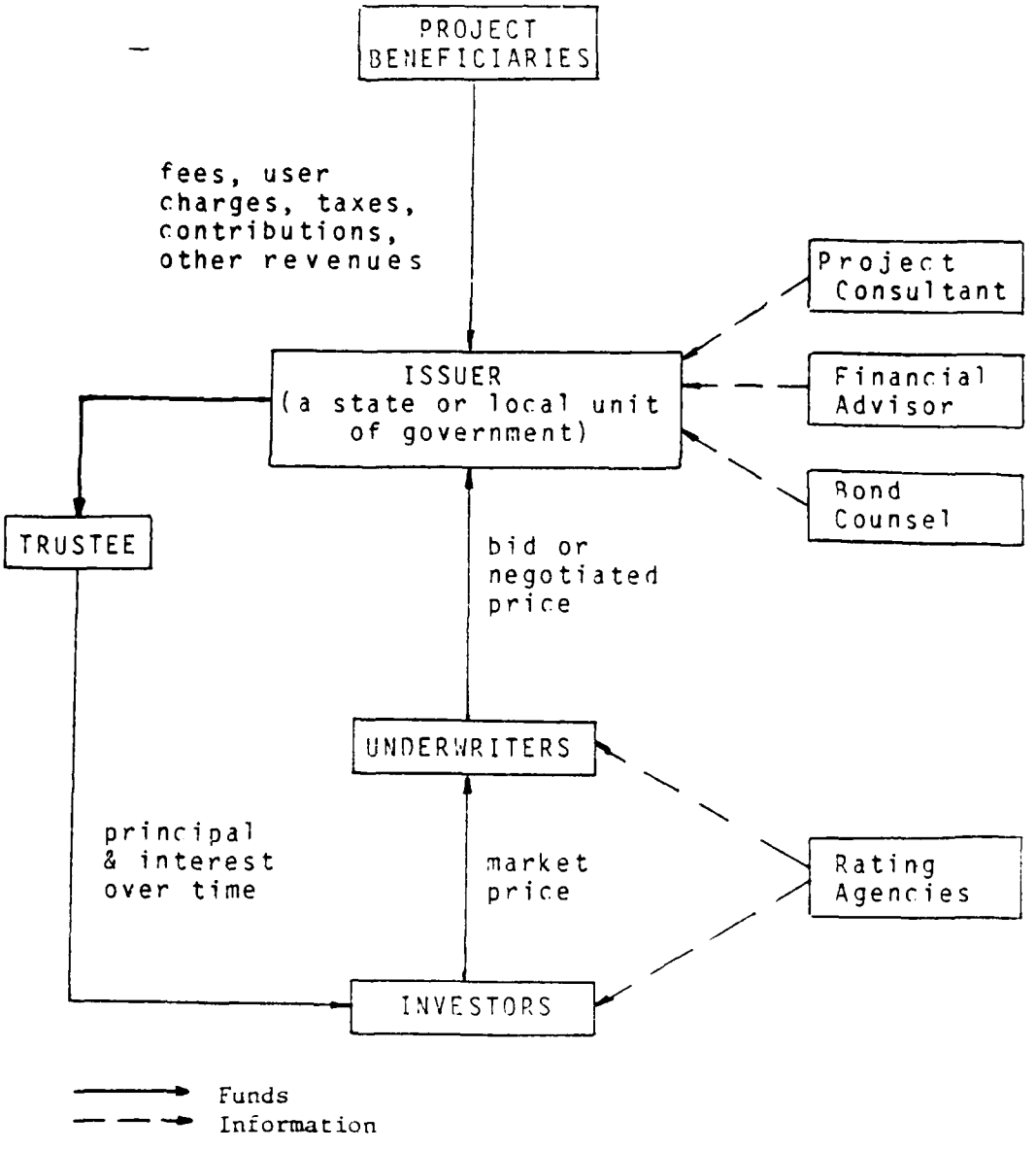

FIGURE 6. FLOWS OF FUNDS AND INFORMATION AMONG ACTORS IN THE BOND MARKET PROCESS

If the bonds are to be sold on the open market, rules of the Securities and Exchange Commission require the issuer to prepare an "official statement." In that statement the issuer must disclose all pertinent information about the agency and all other factors which may affect its ability to construct the facility for which bonds are being sold and its ability to repay the debt. An important part of that document is the statement of the bond counsel, attesting to the facts that:

(1) the obligations are in fact binding upon the issuer

(2) the bonds satisfy all applicable regulations of the Internal Revenue Service necessary to qualify them for tax-exempt status

(3) the bonds conform to all applicable bond orders on existing debt that may constrain the issuance of any further debt by the agency

In reaching that judgment, the counsel must have determined that the bonds comply with applicable regulations on the use of arbitrage, the process of issuing tax-exempt bonds and investing the proceeds at market rates.

The time required to prepare the necessary documentation and market the bonds may itself be a consideration in the planning process. For units of government that have not recently been to bond market, the time required to go through this process may exceed six months.

In response to the changing patterns of federal funding for water resource and other capital intensive projects, several states have established state bond banks, bond guarantees, revolving funds, and

other arrangements to assist local governments with their capital financing. Some states, such as Pennsylvania, have issued their own bonds which are used to make grants or loans to units of local government for selected water projects. Others, including Alaska, Maine, North Dakota, and Vermont have created bond banks which issue bonds and, in turn, use the proceeds to purchase the bonds of local governments within their jurisdiction. North Carolina has a unique institution, the Local Government Commission, which must approve the sale of all bonds issued by any unit of government within the state. It also provides a guarantee that the debt of local governments will be repaid through the exercise of its powers to set local tax rates and user fees if local officials are unwilling to do so. An emerging form of state involvement in local government finance is the use of revolving funds, an example of which is the New Jersey Infrastructure Bank. These funds provide for loans and grants to local units, and funds repaid to these funds are then used to finance the needs of other units. A summary of these innovations is given in Table 6. When taking advantage of these opportunities, local governments would have to comply with applicable state rules.

METHODS FOR RECOVERING COSTS

All of these innovations in bond assistance programs, as well as direct entry into private capital markets and accumulation of retained earnings, are methods by which state and local governments can raise the necessary up-front financing for water projects. They do not include the ways by which state and local governments generate revenues

TABLE 6. STATE FINANCIAL ASSISTANCE PROGRAMS
(after Snyder, Whittington and Hillstrom, 1984)

	Bond Banks	Bond Guarantees	Debt Advisory Service	State GO Bonds	State Revenue Bonds
Alabama					
Alaska	X				
Arizona					
Arkansas					
California				X	X
Colorado				X	X
Connecticut				X	
Delaware					X
Florida				X	X
Georgia					X
Hawaii				X	
Idaho			X		X
Illinois				X	
Indiana				X	
Iowa					
Kansas					
Kentucky		X	X		
Louisiana					
Maine	X			X	
Maryland				X	X
Massachusetts				X	
Michigan				X	
Minnesota		X		X	
Mississippi				X	
Missouri				X	
Montana					
Nebraska					
Nevada	X	X			
New Hampshire					
New Jersey				X	
New Mexico				X	
New York					
North Carolina			X	X	
North Dakota	X				
Ohio				X	
Oklahoma					
Oregon			X	X	
Pennsylvania				X	
Rhode Island				X	X
South Carolina		X			X
South Dakota					
Tennesse				X	
Texas				X	
Utah					
Vermont	X			X	
Virginia					
Washington				X	
West Virginia		X			
Wisconsin	X			X	
Wyoming					

from the beneficiaries of projects necessary to create those capital reserves or pay back the debt that is incurred when bonds are sold or loans are made. While some experts treat both kinds of methods under a single general heading of financing techniques, it is useful to keep them separate in this discussion.

Although the term may not be technically correct in all instances, this second group of techniques is commonly referred to as methods for "cost recovery." They include (1) general and selective taxes; (2) user charges; (3) special assessments and special district levies; (4) developer contributions; and (5) one-time capital charges, referred to as development fees, impact fees, availability charges, or system buy-in charges.

As shown in Figure 3, there are some general trends in the use of these different types of methods that are worthy of note. First, property taxes remain an important source of financing for local governments, but the trend toward less reliance on them has been accelerated in the past decade. They now account for less than one-half of local governments' own source revenues. State and local governments are increasingly relying on income and property taxes to pay for those services which benefit the public as a whole and for which special taxes and charges cannot be levied. A corollary is that they are placing greater reliance on user charges and other special levies to generate revenue from services that benefit particular users. Figure 3 reflects that trend by the steady increase in the share of own-source revenues that is available from user charges. As noted by Snyder and Stegman (1986), there is also an increasing

reliance on selective sales taxes, such as those on motor fuels, and designated sales taxes to pay for particular services. In North Carolina, for example, the state legislature enabled local governments to increase their sales taxes in 1985 by one-half of one percent, but the legislation also required that certain fractions of the revenue from that increase go for water and sewer services and for public schools.

User charges may be used sometimes to cover capital costs and debt service as well as operating costs. That is the usual practice in the electric power industry and other utilities where the only charge that a consumer pays is based on the quantity of service actually used. By contrast, in some organizations the use of one-time capital charges for water supply, wastewater disposal, transportation, and drainage facilities is becoming widespread, especially in urban areas that are experiencing growth. Instead of requiring all consumers of a service to share in the cost of new facilities, one-time capital charges are being levied against new customers, and the amount of the charge is based on the cost of expanding the facilities to meet the need of new consumers. These charges are variously referred to as "tap-on" fees, development fees, impact fees, system development charges, availability charges, and buy-in charges.

Revenues from impact fees can account for a significant proportion of income to water resource agencies. In Gwinnett and Cobb counties, Georgia, rapidly growing suburbs in the Atlanta metropolitan area, income from these charges accounted for over 20 percent of total income to the water and sewer agencies that serve those counties. A key

element in the financing plan for a pipeline to transfer water from the Roanoke River to the city of Virginia Beach, Virginia, is an impact fee of $2,400 on each new dwelling unit. These fees are in common use in southeastern and southwestern states that are experiencing growth. Development fees in Fort Collins, Colorado (population 85,000), were as follows in 1986: water plant, $2,500 for a 10,000 square foot lot; sewer plant, $1,600 for each dwelling unit; storm drainage, $1,400-$10,000 per acre; and water rights equal to the cost of 3 acre-feet per acre of development.

Special assessments, special benefit, and special district financing are also an important element in financing new facilities at the local level. Special assessments are the traditional means by which residents or landowners of an identifiable area that receives the benefit of a particular project can be assessed through liens to recover the cost of the project. In that way, other citizens of the jurisdiction that levies the assessment but who do not share in the benefits of the project do not share in its cost. Allocation of the cost within the benefited area can be done in one of several ways, per acre, per front footage, per lot, or per assessed value, whichever appears to be the most equitable.

As noted by Snyder and Stegman (1986), that concept has been enlarged in recent years to permit the imposition of impact fees, taxes, and user charges in designated areas that receive the benefits of a particular project. The benefited area may be designated by formation of either a dependent or an independent special district. Illinois makes wide use of these types of districts for water manage

ment with 781 drainage districts, 23 flood control districts, 137 for sewer services, and 62 for water supply. California is another state which has a large number of special purpose water management districts, 212 of them for irrigation and 370 for water supply. Colorado, Oregon, and Texas are other states in which large numbers of special water management districts are to be found. As one might expect, many of these districts are rather small, but that same concept can also be applied at a much larger scale as in the case of Florida's water management districts where the entire state is divided into only five districts.

BARRIERS TO SUCCESS IN PROJECT IMPLEMENTATION

Those examples are but a few of the special arrangements that may be used by state and local governments to develop and manage water resources and to finance the necessary capital facilities. However, as noted throughout this discussion of the alternative institutions for water management, their planning processes, and their financing methods, project planning and development processes face many barriers to success. Those barriers may be procedural, political, environmental, administrative or organizational, legal, or financial. A key element in the planning process should be the identification of potential barriers and the development of strategies for handling them if they arise.

Procedural difficulties may arise because of differences between the more formal methods of planning at the federal level and the less formal methods of many state and local governments. Those units using

less formal methods, especially the smaller ones, may be unable (at least initially) to state their objectives and criteria in the language that is familiar to federal water resource planners. There may be differences in the planning horizons used by different partners in the process. Traditionally, federal projects have been larger than those developed by local governments, and planning horizons for those projects tend to be much longer than those used by local governments. Local agencies may prefer their own demographic and economic projections to those used by federal agencies. Analytical methods used by the several units of government and their consultants may also differ from those used in the federal government. Technical design standards are also likely to be quite different, and the cost implications of these differences may be quite significant.

Political problems may stem from many sources; usually they are site specific. For example, a project may require the [illegible] of residents or economic activity in [illegible] realized in another. That is the [illegible] projects and to some extent [illegible] zation projects tend [illegible] may view such proposals [illegible] forces. Projects [illegible] may create [illegible]

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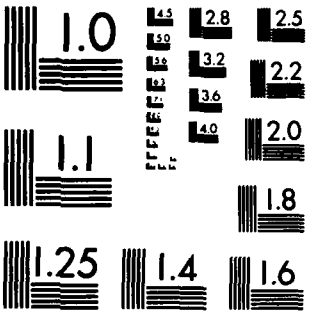

Environmental problems are often expressed as political barriers involving disputes over possible impacts and the best uses of resources. They represent perhaps the greatest single category of obstacles to project implementation, and resolving those disputes can require extended periods of time. The record of water resource projects in the 1970s is replete with examples of long delays resulting from litigation over environmental issues.

Administrative and organizational difficulties in the project planning and implementation may also arise from many sources. One of the more common causes is a change in political administrations. If planning and implementation span more than a single administration, there is likely to be a loss of momentum due to changes in key leadership positions even if political support for the project is not altered by the outcome of an election. Institution memory suffers with changes in administrations, and administrative priorities may be altered. Changes in style of individual leaders may also affect progress toward project completion.

The lack of a clear definition or delegation of responsibility may also present an obstacle to success. If a clear allocation of responsibility for various tasks in the planning process is missing, projects may tend to lie in limbo for long periods of time.

The absence of unambiguous legal authority to undertake one or more aspects of the project may further impair progress. Uncertainties about acquisition of lands, financing authority, necessary permits, and other legal issues can easily stall projects for considerable periods. Then, in many cases, there is the possibility of court action by those

who oppose construction of a project, and even if the proponents are ultimately successful in defending the project, delays may be counted in years instead of months.

Finally, there are financial barriers. The question of financial feasibility should obviously be addressed early in project planning. Although a final determination cannot be made until projects have been designed and cost estimates have been prepared, the fiscal capacities and willingness of project sponsors to raise capital and operating funds can be established early in the process and used as a guide in the planning process. Uncertainties about federal, state, and local authorizations and appropriations cannot be eliminated in advance of the planning process, but a careful analysis of the financial capacity of each interested party and their past records in interlocal ventures may be good indicators of their capabilities and willingness. If there is considerable uncertainty about which units will ultimately participate in the project, the range of alternatives that are formulated can reflect different assumptions about the sources of financing. Sensitivity analysis on particular projects may also be used to evaluate the consequences of one or more participants dropping out during the planning or implementation process.

CONCLUSION

What all of this points to is the fact that the new partnership arrangement that is being established between federal and nonfederal sponsors of water resource projects brings with it a demand for greater sophistication in the planning process. Federal agencies will be

confronted with a very large variety of state, regional, and local organizations with which they will be doing business. While some broad generalizations can be made about these organizations, their project planning criteria and methods, and their financing alternatives, the details that may be crucial to the success of a particular project can be done only on a case-by-case basis. It is important that those issues be addressed early in the planning process, preferably at the reconnaissance stage. In those instances where barriers cannot be overcome, governmental efficiency will be served by making a decision to terminate planning as soon as possible. When reconnaissance studies indicate that planning should proceed, governmental efficiency will be served by formulating effective strategies to minimize obstacles before they become insurmountable.

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USER CHARGES AND COST RECOVERY FOR WATER RESOURCE PROJECTS*

Leonard Shabman
Professor
Department of Agricultural Economics
Virginia Tech
Blacksburg, VA 24061

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With the increased non-Federal cost sharing now required for implementation of Corps of Engineers Water Resources projects, the design of innovative strategies for cost recovery by project users will take on importance in the project planning process. If measured economic benefits of a project are real (that is, people are willing to pay for the project outputs) and if benefits exceed costs, there is, in principle, an adequate revenue base for non-Federal interests to recover costs from project beneficiaries. Indeed, recovering costs for a project by user fees is not a matter separate from the "need" for, or benefits of, the project.

This paper will briefly discuss the competing goals that might be served by any user fee system, some general approaches to user charges and the reality that there is no ideal user fee system that serves all goals. Next the paper will discuss some of the practical planning questions that must be answered in designing a user fee system. The last section of the paper will develop a matrix of user fee strategies built upon the economic arguments which preceded it.

Forms and Goals of User Fees

There are two forms of user fees: prices and taxes. A price is a direct charge for a good or service paid voluntarily by the consumer; failure to pay the price results in exclusion from use of the product. In contrast, taxes are required payments to a government entity, enforced by threats of sanction for nonpayment rather than by denial of a service. Taxes therefore require prior consent of taxed parties to subject themselves to future levies.

There are several possible goals for a user fee strategy whether based upon taxes or prices: cost recovery, equity, other social goals, and efficiency. Also, administrative ease is relevant when user fee collection is a concern. Frequently user fee discussions at the project level begin with, or focus on, equity as a primary concern. However, equity can be defined in two different ways--by

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an ability to pay principle and by a beneficiary pays principle. Ability to pay suggests that charges be adjusted to reflect the beneficiary income status. This adjustment to a user charge would be illustrated by the use of "lifeline" rates for electric utilities. Similarly, financially troubled economic sectors might be exempted from user fee requirements on an ability to pay basis. For example, financially troubled agricultural operators might be exempted from paying a charge for a project providing them with flood protection. Whenever ability to pay considerations enter into setting fees, the result will be higher charges to others who must contribute to paying project costs.

In contrast with the ability to pay principle, benefit based charges are deemed to be equitable because the payments vary with benefits received. For example, consider two land parcels with annual flood control benefits of $2000 and $1000 respectively. A project which protects both parcels is built at an annual cost of $1,500. The project benefit cost ratio is 2:1. Benefit based cost recovery would allocate the $1,500 project cost between the two parcel owners in relation to benefits received. Thus, the parcel owner who receives $2,000 in benefits (2/3 of the total) would pay 2/3 of the projects cost, or $1,000. The other parcel owner would pay $500.

Efficiency based charges seek a spatial and temporal allocation of resources to maximize net benefits from (in this case) a water resource investment. The economics literature suggests that the price of project outputs should be set equal to the cost of providing the next, or marginal, unit of output. This marginal cost pricing rule insures that each project user pays the cost incurred to provide them with the product, but no more than that cost; typically all consumers would be expected to pay the same price for the output as the last user. Note that this marginal cost pricing rule is consistent with the beneficiary pays equity principle, but may be inconsistent with the ability to pay principle. Marginal cost pricing assures that at all times existing capacity is utilized. As capacity is pressed, prices should rise to ration capacity until new investments to expend project output are made. Marginal cost pricing is a means of testing whether, by how much and when capacity should be expanded. Pricing in this manner provides a test of willingness to pay for project expansion. In addition, marginal cost pricing will encourage adoption of the least costly approach to expanding water supply systems so that the lowest user fees possible can be employed.

If marginal costs rise as additional users are added to the project, then charging each user the marginal cost of providing the service to them will promote efficiency, the benefit based notion of equity and cost recovery for the cost of the project. Cost recovery is served because the prices charged for the project will always equal costs of the last units provided and exceed the costs of

providing all previous units. However, if marginal cost falls with additional users then strict adherence to a marginal cost pricing rule creates an obstacle for cost recovery. This pattern of falling marginal cost can be expected whenever a project has a high initial cost, but once the project is in place, low variable costs are needed to add additional users. In its simplest terms, once a service is provided to one user, additional users can be served at near zero marginal cost and at near zero price. In this case strict marginal cost pricing provides little contribution to recovering capital costs of the project and innovative pricing strategies may be called for. These strategies are discussed later in this paper.

Other social objectives are often cited as goals for a user fee strategy. For example, adding additional project capacity in an attempt to attract economic growth that is not otherwise projected to occur may be a factor in setting fees. If this is the case the cost recovery goal must be achieved by allocating any incremental costs incurred for speculative future project users among current residents and firms in the region. There is no obvious basis for making this allocation because the current beneficiaries of the speculative economic growth are not definable.

Another aspect of this argument is the need to set user fees to retain an existing industry. This might be termed the fugitive industry argument, which argues that higher water charges will cause a business to move outside the region. Therefore, even though a user benefits from a project the user seeks to avoid paying for the project. Several aspects of this argument need to be carefully assessed. First, there is research evidence that raw water availability and cost is not a major factor in industrial location decisions. Once a plant is in place it seems even less likely that marginal changes in charges for a water project will cause a plant to abandon its capital investment unless there are other broader market forces at work.

Pursuing this issue further, if the users are not willing or able to pay for the project then the purported benefits to the user may be suspect. Also from an equity standpoint, if the charges are not set equal to the marginal costs of serving the user, then some other economic sector must pay the bill for the project. If the direct project beneficiary does not pay, then who should? A common argument is that the direct user of the project is not the beneficiary. Rather, consumers, employees of the plant, and the local economy benefit. This argument has an interesting implication. Following it to its extreme, should it also be concluded that the employees of a steel plant, for example, should help pay for the iron ore, a production input like water? Perhaps the general tax payers should pay for the iron ore? Obviously both views are fallacious. It makes far more sense

to charge for water, just as for other production inputs, and let the forces of the market reallocate the burden of the charge through product and input prices.

Another argument is that those who take actions to reduce their reliance on the project should be exempted from paying part of the user fee--a "credit" should be given. At a general level this makes much sense, but only if such a policy to grant exemptions is related back to the need for the project. The presumption for granting a credit is that the project user has taken an action which makes them less dependent on the project. If this is true then the need for the project (at least at the proposed scale) would need to be reassessed to the extent that the credits are numerous. Numerous petitions for exemptions from the fee burden are a signal that some part of the project output is not needed.

Administrative ease requires consideration of two factors. First, legal or administrative limitations may dictate who may be charged or what the level of charges may be. For example, some users may have legal claims limiting payments they are required to make. For example, the Delaware Basin compact is said to "grandfather" certain compact participants and make them exempt from increased user fee for any new project construction. Another example of an administrative limit would be the type of bond strategy that is pursued. Revenue bonds have different user fee support bases than do general obligation bonds and the bonding requirements may dictate the user fee chosen.

The second administrative concern is that the cost of managing a designated fee system may be too costly or may require broad institutional reforms that are not easily achieved. To illustrate, administrative costs may be made lower by assessing fishermen for benefits received by levying a single boat license fee rather than by levying a unit tax on each fish harvested. However, the adoption and use of a license fee may be institutionally constrained if authority to levy such a fee does not now exist or if it exists in another agency of government and a cooperative agreement must be arranged for revenue transfer between agencies.

Toward Benefit Based Charge Strategies

Alternative user fee systems will require trade-offs among equity, efficiency and other goals, subject to the binding constraint that cost recovery be achieved. Administrative constraints that appear to limit the implementation of a particular fee structure should be acknowledged but should not be treated as absolute limitations. Rather, a project analysis should examine the feasibility of

institutional adjustments to overcome these problems. Otherwise unnecessary compromises between alternative goals may be made. Of course, the ability to pay equity principle and other social objectives may dictate that a user fee system should not directly charge project beneficiaries. However, if these concerns dominate the selection of user fees, there is no analytical process for establishing how fees should be set. Therefore, the remainder of of this paper focuses upon the setting of benefit based charges. Benefit based charges can serve the goals of cost recovery, efficiency and the beneficiary pays principle of equity. To set benefit based charges three questions must be addressed.

Question 1. What are the total costs of the projects and the allocated costs to individual beneficiary groups? This cost information is essential for setting the cost recovery goal and for identifying marginal costs imposed by each user group as a basis for user charge strategy. Cost categories to consider as part of the cost recovery base include: (1) the project's capital costs for capacity and associated debt service charges, (2) annual operation and maintenance costs, and (3) sinking fund requirements, if any. These cost categories will need to be allocated as either marginal costs incurred to serve one user group, or joint costs of capacity, which are incurred to serve all project users.

For both efficiency and benefit-based-equity it is necessary to allocate project costs in accordance with the marginal costs incurred to serve a defined project user group. Although the isolation of marginal cost would be a complicated process the basic idea can be described.

The marginal cost to serve any single project purpose is computed as the addition to project cost with that purpose included. To define marginal cost of including purpose A in a project it is necessary to know the project costs that would continue to be incurred without purpose A. For example, if costs are incurred to enhance streamflow to provide cooling water for a downstream industry, and river recreation happens to be enhanced, the marginal cost of the recreation purpose is still zero. This is the case because project costs are unaffected by the occurrence of recreation and the total costs of flow enhancement would be allocated to industrial water use.

However, the "with" versus "without" test for establishing marginal cost may not be applicable at all times because of the "lumpy" nature of project capacity. That is, provision of a unit of project capacity for a single purpose (ex. flow augmentation) in year 1, then makes that capacity available to all additional purposes at zero marginal cost for year 1 and for all other purposes throughout the project economic life. However, the benefits derived from any single

purpose or group of purposes, taken alone may not be sufficient to justify the joint capacity costs. In this case, joint costs should be allocated to project users in proportion to benefits received and user fees to recover costs should also be set in proportion to benefits received. As will be noted below, this may be a situation calling for two part pricing.

Question 2. What are the projects' benefits by user group? This information becomes essential for allocating joint project costs among project users. Benefit evaluation by a third party analyst is a difficult exercise because it ultimately is an analyst's estimate of what other people should be willing to pay for a water project. From a technical standpoint such an analysis begins by being able to demonstrate the marginal contribution of the project output to the profit or general welfare of the user. For example, how would a firm's output level or production process be affected with versus without the project? How would fish populations be affected with versus without the project? Questions such as these are difficult to answer but must precede a monetary benefit analysis. Once the technical foundation is laid, the three principle means of willingness to pay measurement for project outputs (e.g. benefit measurement) are (i) the cost of the most likely alternative that will be chosen without the project, (ii) the change in net income of firms (farms, manufacturing enterprises, fishing boats, utilities, etc.) with versus without the project, and (iii) direct measurement of willingness to pay in quasi or hypothetical markets.

Technique (i) is the most straightforward but may be challenged if the beneficiary argues that without the project they would take no alternative action, but rather might leave the area, do without the project service, or change production practices. Technique (ii) would accommodate the arguments against alternative cost, but it requires detailed data about individual firm revenue and cost conditions. These data are often not available or willingly given. In addition, general market analyses are also required. Technique (iii) relies upon carefully structured questionnaires to elicit expressions of willingness to payor to draw inferences from revealed behavior in other contexts, such as travel to similar recreational site or payments for land near similar projects. Drawing inferences from questionnaires in hypothetical markets and revealed behavior is quite difficult because the statements of willingness to pay are not subjected to actual payment tests and because analogous project situations are difficult to find. (For additional discussion of these approaches in relation to willingness to pay see: L. Shabman, "NED Benefit Analysis and Benefit Based Project Cost Recovery," prepared as part of this contract.)

Faced with such limitations it may be fruitful to consider benefit assessment as a bargaining opportunity rather than a measurement problem. The objective of benefit assessment in terms of setting ones fees is to have parties who will benefit from a project reveal truthfully and with full information their willingness to pay for project costs. It is these benefit revelations which are used to allocate the cost to be recovered among user groups. Basic data and analysis on project effects may be a necessary part of the benefit revelation process, however the route to gaining accurate willingness to pay revelation for setting user fees may be through institutions which provide a forum for negotiation (and mediation) over payment shares. The research literature suggests that institutional forums for negotiation can encourage truthful preference revelation and statements of willingness to pay. Thus, a fruitful approach to the benefit assessment issue for setting user fees may be institutional reforms which permit negotiation over payment shares rather than simply hiring more analysts to manipulate more data.

Question 3. Whose project is this? Finally, it should be noted that the question of who the project serves will always intrude into a marginal cost and benefit analysis. Regardless of technique or approach used measurement will depend upon who has the initial use rights to the water. Consider a case where an increase in upstream use would diminish flows to the estuary and a project for low flow augmentation is proposed. What are the project benefits for purpose of setting fees? If it is assumed that those downstream have a right to a minimum flow then the project is to benefit the upstream users, and benefits are measured in reference to upstream water use. If, on the other hand, it is assumed that the water rights accrue to the upstream user, then the project is to benefit the estuary and the benefits are measured in terms of the estuary uses maintained by the project. One cannot avoid answering the question "whose project is this?", as a starting point for user fee development.

User Fees: An Introductory Guide

Once it is acknowledged that user fee systems must be a compromise of many objectives, the rules for allocating costs and setting fees must be treated as guidelines rather than strict rules for setting fees. Nonetheless, is possible to set fees that do retain the desirable efficiency, beneficiary pays equity, and cost recovery properties of marginal cost pricing. In order to discuss this possibility the concept of "price inelasti ty of demand" needs to be introduced.

When demand is price inelastic total revenue increases with higher prices because the positive revenue effects of the higher price more than offset the negative revenue effect of the reduced consumption. The more price inelastic the demand, the less price needs to be raised above marginal cost to attain a given level of revenue. A price inelastic demand is typically the case when the user feels that the good or service is a "necessity," when there are few alternative sources for the good or service and when there are few substitutes for the product. For example, the demand for household water use for washing and cooking is more price inelastic than is the demand for lawn watering. As another example, the demand for additional depth at a deep water port will be more price inelastic if there are few economically competitive port alternatives available.

The simplest cost recovery pricing strategy is average cost pricing. Total costs are summed and divided by the number of customers (or output of the project) to compute a price to be charged. Municipal water systems often use this type of pricing approach with prices quoted as "cents per 1000 gallons." Ton-mile fees for shallow draft navigation are another example of average cost pricing, as are prices set per kilowatt hour of electricity. As long as the demand for the output is price inelastic, prices can be raised until the revenues equal to cost are realized. If demand for project outputs is highly price inelastic, capacity utilization under average cost pricing will be close to that achieved with marginal cost pricing.

Two part pricing requires the user of the project output to pay a fixed fee to gain access to the output; then a second price is charged which varies with levels of use. The fixed charge is usually associated with capital outlays where investment does not vary with use levels and there is a price inelastic demand for access to the project. The variable charge follows marginal cost. An example of this strategy is the use of one-time connection charges for water supply systems with monthly charges varying with the amount of water use. Another example would be a case where use of a park would require an annual pass plus an entry fee for each park visit. Carefully designed two part pricing can reconcile the optimal use of capacity objective with the need to recover costs. Fixed access fees are used to recover most costs, and low variable use fees will result in project capacity going unused.

Variable pricing or discriminatory pricing is charging "what the market will bear." Rather than tying prices to costs, prices are set in relation to the price inelasticity of demand of different classes of users of project outputs. Different classes of users would pay different prices for similar services, with higher prices charged in the markets with the more inelastic demand. In this manner

revenues needed to recover costs are collected and there is little discouragement of project use. As long as the users are separated (e.g. no resale of project outputs between users is possible) it is possible to pursue this pricing approach to recover costs. Examples of pricing by this approach are numerous: increasing block pricing and peak load pricing for electricity or water, variable lockage fees for navigation and vessel draft fees or commodity based use fees at ports.

A second general principle that is often discussed, along with "price elasticity" when designing revenue collection vehicles is the "cost of exclusion" or "vendibility of outputs." When costs of exclusion are high, the good must be provided to others at zero price. Attempts to charge a positive price are thwarted because failure of the user to pay cannot be penalized by denying them the service. In the water resources field the best example is flood hazard reduction. If flood hazard reduction is provided to one land parcel, it must be provided to an adjoining parcel. If the owner of the adjoining parcel fails to pay for the flood control service, it is not feasible to withhold the flood control service for nonpayment. The individual can "free ride" on others' payments. Based upon this logic, flood control has been provided by government and paid for with general tax revenues.

The free rider problem is the basis for arguing that flood control is non-vendible; that is, voluntary price-like payments will not be made by beneficiaries. However, the taxing power of government can be used, in principle, to extract payments from flood control beneficiaries according to benefits received. The increment in value to land which will result from reduced flood risk can be identified and taxed to generate revenues for flood hazard reduction projects in proportion to benefits received.

This free rider argument also can justify the use of general increases in local sales or property taxes as a revenue source for cost recovery from projects that provide all types of benefits. If projects increase economic activity in the region, area businesses and properties directly and indirectly benefit from the project. However, the owners cannot be easily excluded from these benefits if they do not make payments toward project cost. These benefits can, in part, be repaid by the collection of general sales, property or income taxes. It is necessary to reach a political and analytical consensus that these benefits are real before such an argument can be pursued in the name of benefit based cost recovery. Regional economic impact analysis methods will need to be made part of project analysis if this argument is pursued.

Another strategy to overcome free rider behavior is to tax goods and services whose use is required in order to gain the benefits of the project. This is done by attaching special taxes to services that will be used jointly with project outputs such as sporting goods supplies necessary for recreation or storage space at wharves near transshipment points.

Choosing a Cost Recovery Strategy

This paper has emphasized the possible link between cost recovery and benefit based charges. However, practical administrative considerations as well as other goals of a user fee system have been acknowledged. These factors may suggest that general revenue sources such as state or local income and sales tax be the basis for paying project costs. Such a cost recovery approach is not improper, but there is no assurance that such an approach will meet efficiency and beneficiary-pays equity goals.

Once cost recovery becomes the dominant concern, it may be desirable for a project analysis to go beyond strictly tying charges to clearly identifiable beneficiaries. Particular attention should be paid to the possibilities of raising revenues from the sale of highly vendible outputs such as electric power and industrial water supply at market value based, as opposed to cost of production based, prices. In this way it may be possible to pay for the cost of non-vendible outputs and more easily recover total project cost. It must also be acknowledged that some users are "captives" of the project by the nature of their demand and the limited available substitutes; that is, their demand is highly price inelastic. Consider, for example, the commercial harbor user who will use the port whether the channel is improved or not. Even though the user does not benefit from the channel improvement, he still may be made subject to a charge to pay for that improvement. This may sound like an unacceptable practice, but it is, in essence, what is done whenever new water system capacity costs are divided among old and new customers of the system.

In the final analysis, the concepts described above are the planner's contribution to a user fee planning process. That process leads to a political choice problem which will be strongly influenced by a desire to minimize the changes made to existing revenue collection mechanisms and by a shifting perception of equity. Local familiarity with the price or tax vehicle is likely to increase its acceptance. Thus, an established tax base, such as real property, may be more acceptable as a charging vehicle than an alternative such as special sales taxes on recreational equipment. If the authority to employ certain charge strategies such as value increment taxes requires formation of

special districts or new regional authorities there may be a reluctance to consider these charging mechanisms. Institutional changes to overcome these obstacles are possible, but will be resisted if "business as usual" cost recovery options are available. Perceptions of fairness will also affect political acceptability. Fairness arguments have two dimensions which will interact in unpredictable ways. In one dimension fairness will dictate that charging strategies should insure that beneficiaries pay for services received. In another dimension, fairness will dictate that consideration be given to ability to pay, permitting a cross subsidization between project beneficiaries, for example, using revenues from sales of industrial water to repay costs for flood control.

Numerous alternative pricing and taxing strategies are available for collection of revenues. Tables 1 and 2 provid a more complete categorization of strategies and offers illustrative examples of the cost recovery (pricing and taxing) strategies available for alternative purposes of water development projects. While each cell in Tables 1 and 2 include examples of a cost recovery strategy that might be employed, numerous other possibilities may exist for each purpose. The challenge for the water resources planner is to fill in the cells in these tables for a particular project and then to assist project sponsors in the selection of a mix of strategies for cost recovery that best meets the conflicting goals of efficiency, equity, other objectives, administrative cost and, of course, cost recovery.

TABLE 1

Illustrative Pricing Strategies for Cost Recovery

Purpose	Unit Cost	Two-Part	Variable
Water Supply	$/1000 gal	connection fee plus $/1000 gal	block rates; peak load; seasonal pricing
Hydropower	$/kwh	connection fee plus $/kwh	block rate; peak load
Shallow Draft	ton-mile fee	license fee plus ton-mile fee	locking fee
Deep Draft	tonnage fee; storage fees; dockage fees	license fee plus tonnage fee	vessel draft fee; commodity based charges
Flood Hazard	-	-	-
Recreation	entry fees; use fees	annual pass plus entry fee	peak use entry fee surcharge

TABLE 2

Illustrative Tax Strategies for Cost Recovery

Purpose	Value Increment	Tax on Complements	General Taxes
Water Supply	differential assessment/ service area	-	sales, income, property
Hydropower	-	-	-
Shallow Draft	differential assessment/ waterfront property	fuel tax	-
Deep Draft	differential assessment/ waterfront property	tax on wharf storage	sales, income, property
Flood Hazard	differential assessment/ protected property	-	sales, income, property
Recreation	differential assessment/ park adjacent property	tax on sale or rental of sporting goods; marine fuel tax	sportsmen's licenses; non-game checkoffs; sales, income, property

NED BENEFIT ANALYSIS, BENEFIT BASED PROJECT COST RECOVERY AND PLAN FORMULATION*

Leonard Shabman
Department of Agricultural Economics
Virginia Tech
Blacksburg, VA 24061

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Under the terms of PL 99-662, local sponsors must repay to the federal government a share of the costs for water resources project planning and implementation. This repayment requirement suggests the possibility of capturing revenues for making this payment from project beneficiaries. To the extent that cost sharing payments are debt financed benefit based revenues would be used to retire the debt, *even if* that debt is financed with general obligation bonds. If benefits of a project are in excess of cost, there should, in principle, be an adequate revenue base for repayment of costs by extracting money payments from project beneficiaries. The long standing federal planning requirements for project analysis dictate that the planner quantify the level of benefits in monetary terms -- terms which should provide the basis for designing benefit based cost recovery schemes. However, how well can current benefit analysis practices predict revenue potential?

The preceding question presumes that local sponsors will collect revenues from project beneficiaries rather than general taxpayers. During the brief time that PL 99-662 has been in effect benefit based revenue collection rarely has been adopted by local project sponsors. In part, this may be because plan formulation and benefit analysis has been accomplished before the advent of cost-shared planning. Also, many of the initially funded projects have had broad based public support. However, it does not follow that this will continue. As more projects are proposed, broad political support may decline and general revenue availability fall. Then charging beneficiaries may receive more consideration. Plan formulation and benefit analysis completed for future projects (under cost shared planning) can not seriously consider benefit based revenue potential. The federal planning requirements for benefit-cost analysis will continue. Therefore, the economic analysis data and procedures to support a benefit based revenue analysis will remain available. It is possible that an increased understanding of federal economic evaluation procedures can demonstrate their utility for assessing revenue potential.

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BENEFITS AND REVENUES

NED Benefits Defined

In the Principles and Guidelines (P&G) project benefits are defined by a project's contribution to national economic development (NED). The basis for NED benefit measurement is defined in the P&G (page 9) as

> "... the willingness of users to pay for each increment of the output from a plan. Such a value would be obtained if the 'seller' of the output were able to apply a variable unit price and charge each user an individual price to capture the full value of the output to the user."

This definition permits outputs of water projects to be considered either consumer goods or production inputs into a production process and the economic demand for project outputs by consumers and business firms establishes project benefits.

In conducting an NED benefit analysis the following conditions are initially assumed to hold.

1. Project users are as informed as the project planner about the services to be provided by the project over time.
2. Project users are indifferent to the variability of the state of nature (ex. flood and drought hazard) that will arise both with and without the project.
3. Sellers of the project output charge a zero price even though the project output is vendible.
4. Full employment and no change in general price levels (inflation) will prevail, but relative price change is possible.
5. There is no measurement error in the evaluation of the demand for project outputs.[1]

In Figure 1 the economic demand function for project outputs has been labeled as a marginal willingness to pay function, tracing out the variable prices which could be charged each of the users of the project output, consistent with the benefit definition of the P&G. In Figure 1 the level of the service without the project is 1 and with the project is 6. Therefore, the shaded area of the figure represents the benefits of the project in terms of the demand function shown.

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[1] The P&G does call for sensitivity analysis of the NED benefit evaluation. The focus of the sensitivity is upon error in application of the measurement methods and not upon the validity of assumptions 1-4, above.

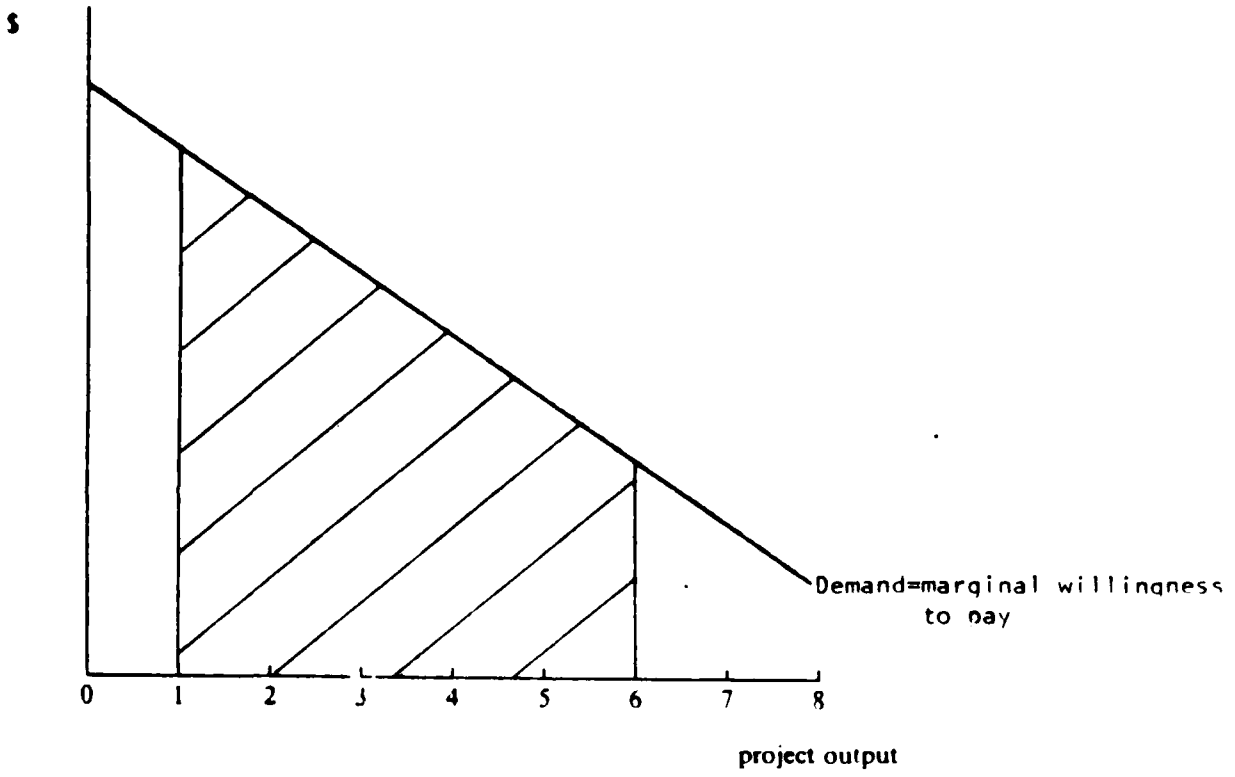

Figure 1. The Demand Function

The demand function shows how the quantity demanded of project output will vary with price charged. The slope depicts the "own price elasticity" of demand. The position of the function in Figure 1 depends upon the other factors which will influence the total willingness to pay for the output. In the general notation of equation 1, the demand function can be represented as follows:

Quantity demanded = f(price of output, income of users, number of users, price of other goods, preferences, information, risk attitudes) *(EQ 1)*

All the variables in equation 1, excluding the price of the output, are shifters of the demand function which can increase or decrease willingness to pay benefits. (See Figure 2). Consumer income differences will change willingness to pay. Increased number of users will increase aggregate willingness to pay. Increases in prices of goods that are consumed as complements to the project output (for example, fishing tackle for recreation) will reduce willingness to pay. Increases in prices of goods that are substitutes for the output will increase willingness to pay for the output (for example, increases in prices of land off the flood plain may increase the willingness to pay for flood protection). Clearly, changes in preferences for project outputs can affect willingness to pay.

Of particular note are that improvements in information and user understanding about the output of the project can affect willingness to pay. For example, if land owners better understand the level of protection provided by a flood control project, and the costs of restoration of damaged property, they may alter their willingness to pay for the flood control. The NED benefit analysis assumes that users of project output have the same information about the project as the project planner. Last, risk attitudes may play a role in the determination of willingness to pay for flood and drought protection. Therefore, the willingness to pay may exceed the expected value of flood or drought damages if the project beneficiary places a premium on the lowering of the probability of flood or drought damage, without regard to the consequences. An NED benefit analysis assumes that project users are indifferent to variability in the state of nature.

The demand concept can be readily extended to project outputs which serve as a production input, such as irrigation water. In these cases willingness to pay is measured by the increases in profits to a commercial enterprise with versus without the project. Figure 3 illustrates this effect, where the change in the firm's profit associated with increased production depends upon whether the project is in place.

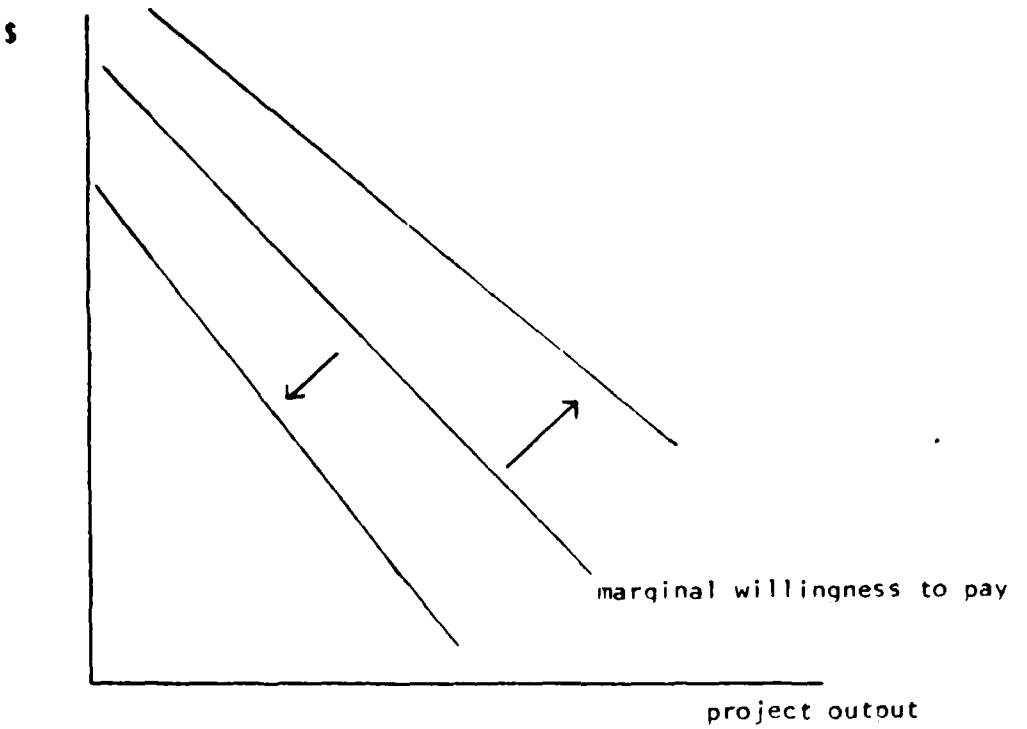

Figure 2. Shifters of Demand Function

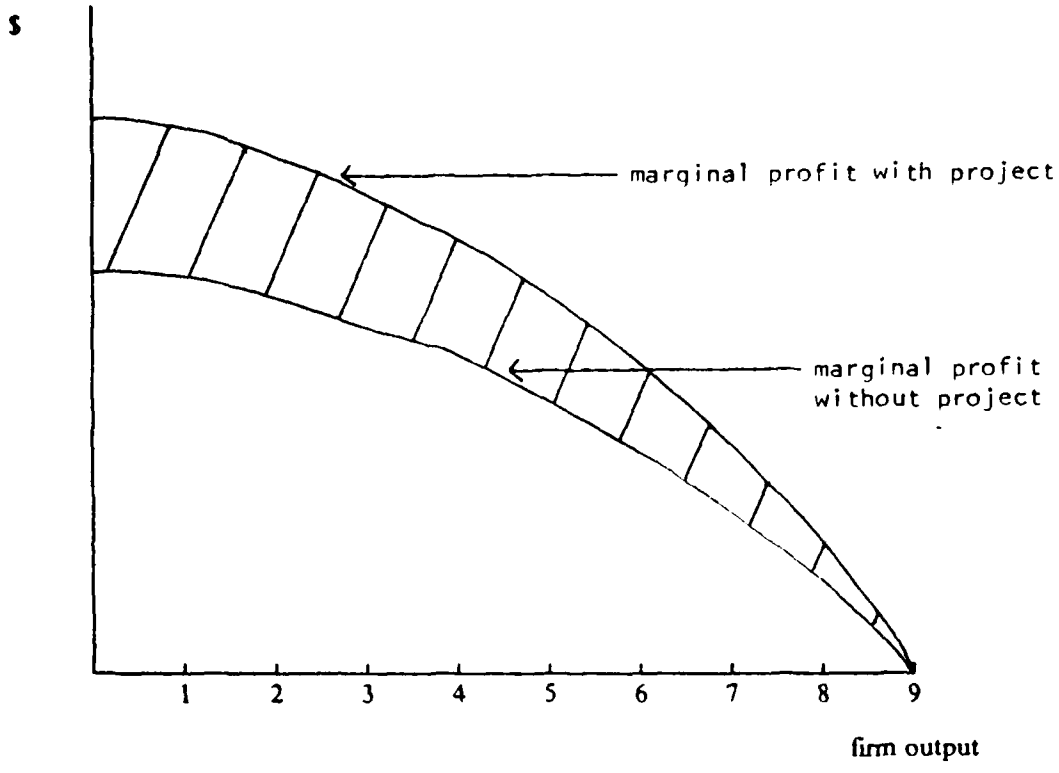

Figure 3. Marginal Profit Functions With Versus Without Project

In Figure 3 the marginal profit functions with and without the project are shown. The marginal profit function shows the change in firm profit levels with an increase in firm production. In Figure 3 marginal profit is zero at 9 units of output both with and without the project and, therefore, profits are maximized at nine units. The shaded area of Figure 3 represents the addition to firm profit with versus without the project and is a measure of a single firm's willingness to pay for project output. Figure 4 transfers the profit increase shown in Figure 3 for a single firm to a diagram relating change in profit to units of project output. This is the willingness to pay by all firms for project output. Total willingness to pay will be established by the number of firms benefited by the project.

In a simple equation,

$$Profit = [\ Unit\ Price - Unit\ Cost\ of\ Production\ ] * Units\ Produced \qquad (EQ\ 2)$$

Therefore, the willingness to pay for project output, that is increased profit, will depend upon how the project affects unit price of the output, units of product which can be produced and/or unit costs of production for each affected firm. Of course, the actual willingness to pay will also depend upon the firm owners information and understanding about how the project will affect factors as shown in equation 2. Also, to the extent that firm output varies with certain natural events (flood and drought) the firm may be willing to pay an amount in excess of the expected profit increases from flood or drought damage prevention, if the firm owner places a premium on the lowering of the likelihood of the damage occurring without regard to the profit consequences. As with the consumer demand case, an NED benefit presumes that the user has full information about the project and is indifferent to variability in the state of nature.

The arguments associated with Figures 3 and 4 are analogous to the more general format of the downward sloping demand function of Figure 1 and in subsequent discussion graphical analysis will be in general demand terms for all project output -- both consumer goods and production input.

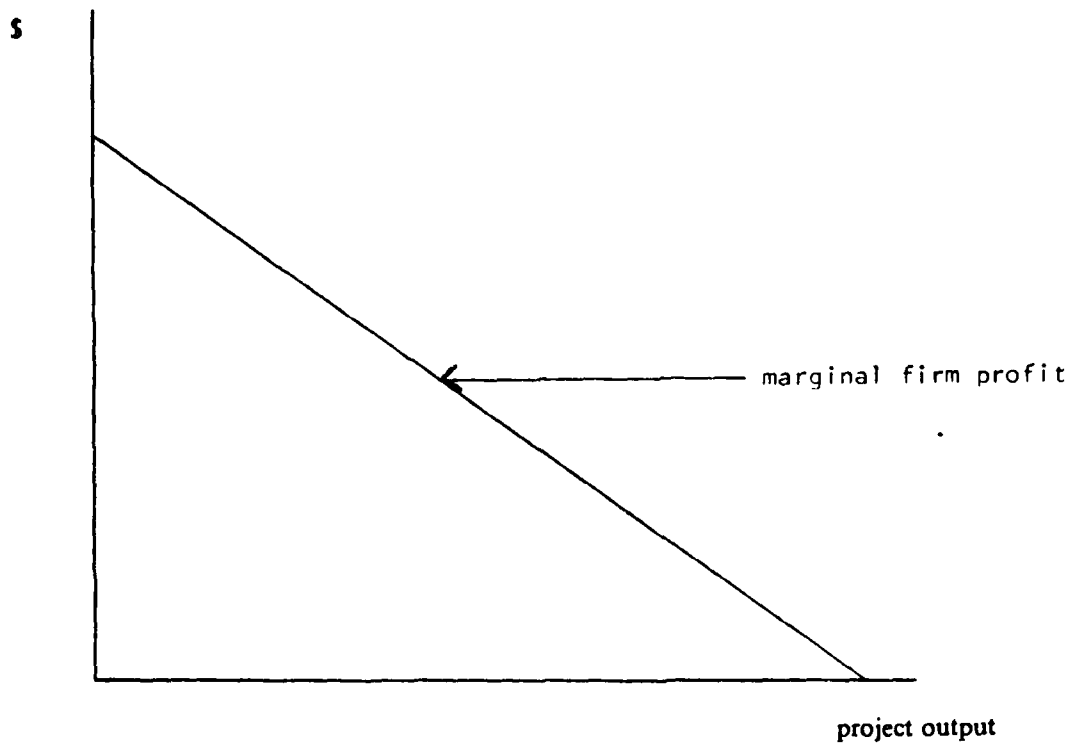

Figure 4. Demand for production input

Benefit Based Revenues

Before discussing benefit based revenues in relation to NED analysis, four definitions will be offered.

- Benefit based revenue is the total cash collections recovered from charging beneficiaries a positive price (or tax) for using project output.
- Other revenue sources for project repayment include all general taxes on the community which are levied without relation to project benefits received.
- Price is a direct charge paid voluntarily by the user; failure to pay results in exclusion from use of the service. Prices may be uniform unit prices or variable prices. Unit prices are a uniform charge to *all users* of project output. Variable prices are differential prices charged to project beneficiaries according to individual differences in willingness to pay.
- A tax is a required payment to a government entity; failure to pay is enforced by sanctions rather than denial of the service. Taxes may be uniform per unit of output or variable with benefits received.

The relationship of benefit based revenues to the demand for product services can now be discussed in the context of Figures 5 and 6. In Figure 5 a uniform unit price is charged project beneficiaries. The revenue is the shaded area. At the unit price shown, 6 units of output are taken. Some benefits are forgone as certain users are excluded by price from consuming project outputs while others pay less than they would be willing to pay and earn a surplus. The revenue earned from the unit price depends upon the position and slope (own price elasticity) of the demand function. In Figure 6 a variable price system is shown. In this case three separate prices, charged to three separate groups of users, are shown and the resulting revenues are displayed as the shaded area in the Figure. In this case more of the total willingness to pay is captured by the variable prices. The revenue earned from any price or tax system depends upon the determinants of demand. Specifically, defining the slope (elasticity) and position of the demand function is a key analytical problem in a benefit based revenue analysis.

A second matter to consider is how the benefit based revenue requirement can be derived. First, the local sponsor repayment requirement (ignoring different project purposes) is established by the product of the project cost and the cost share rate. That is,

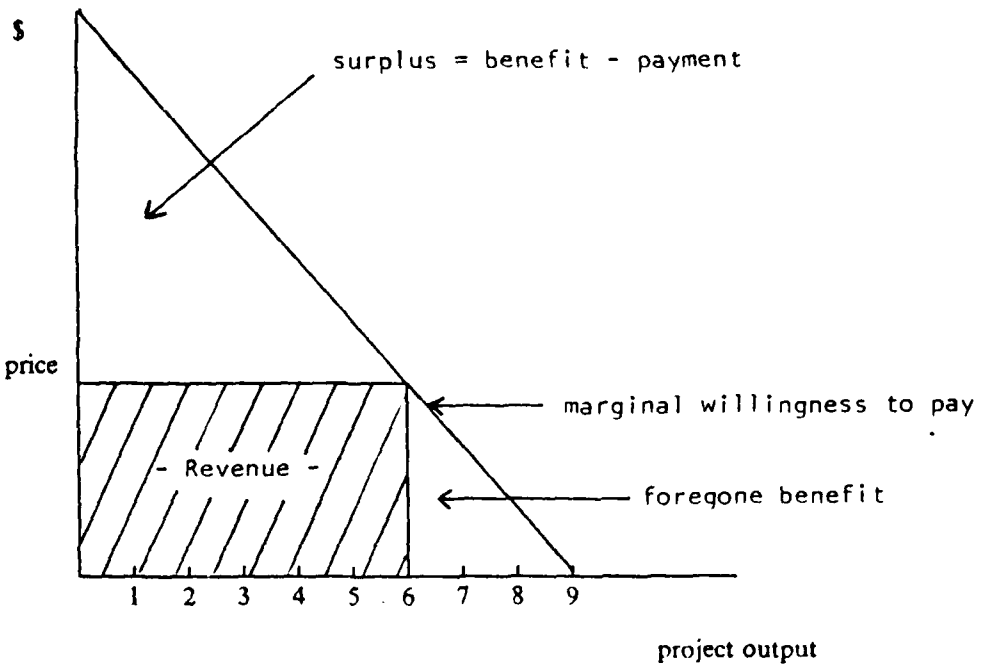

Figure 5. Revenue With Single Price

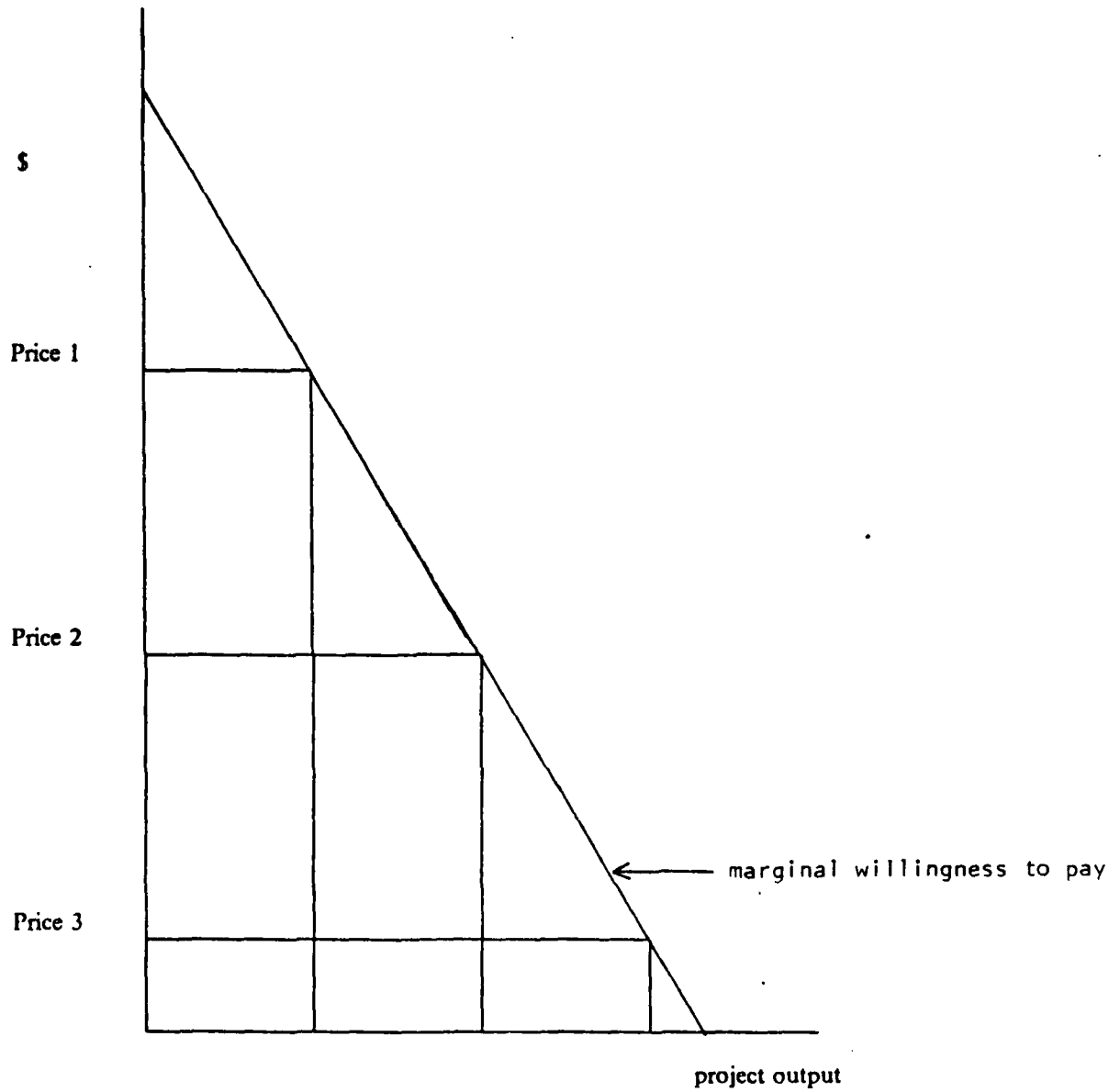

Figure 6. Revenue With Variable Prices

*Project Cost * Cost Share Rate = Local Sponsor Repayment Requirement*

If the local cost is debt financed, an annual repayment requirement for collection from project beneficiaries can be computed. That is,

$$\frac{\textit{Debt Service}}{\textit{Total Project Benefits}} = \textit{Proportion of Benefits to "Cash In" for Revenues}$$

Clearly, the lower the cost share rate and the higher the project benefits the less will be the proportion of benefits which need to be "cashed in."

Finally, it should be noted that the application of the five assumptions of an NED analysis may be justified if an estimate national economic development is the purpose of the measurement analysis. However, and as will be discussed, the assumptions do not realistically represent the demand for the project outputs at any given site. Therefore, a distinction must be drawn between an NED benefit which is computed based upon these assumptions and the cash-flow-willingness-to-pay (CFWTP), which is linked to the demand relationship that actually exists at a project site. That is, CFWTP is the area under the demand curve recognizing that the five assumptions listed earlier are all violated in the project area. *Specifically, CFWTP is analogus to doing a market feasibility revenue analysis. This distinction is important because benefit based revenues are the actual extraction of cash payments from project users, rather than the measurement of hypothetical revenue collections which is the conceptual basis of an NED benefit estimate.*

NED BENEFIT ANALYSIS AND CASH FLOW WILLINGNESS TO PAY

A careful reading of the P&G will identify six acceptable categories of empirical methods for estimating NED benefits: administrative prices; market prices; simulation of market prices through travel cost and contingent valuation methods; change in net income; cost of the most likely alternative; change in land values. Each of the methods will be discussed in terms of its ability to provide an estimate of CFWTP.

Administrative Prices

An administrative price is one which is established by planning regulation and is to be applied to establish a benefit value for each specified unit of project output. The only opportunity to utilize administrative prices is the application of unit day values for certain recreation activities at "smaller" projects. The planner selects a unit day price and applies it to the recreation days provided with versus without the project to arrive at a benefit estimate.

These unit day prices have a long history dating back to the issuance of Senate Document 97, Supplement 1, in the early 1960's. At that time the unit day prices were set in some relationship to prices charged at private recreation facilities. At that time, it was reasoned that observation of private sector pricing strategies provided market evidence of a users willingness to pay for recreation. Later adjustments were made to judgmentally reflect average consumer surplus values from travel cost and other types of recreation demand studies. The unit day value logic for establishing benefits may be flawed for at least three reasons. First, the implied assumption of the method is that the demand for water project recreation is perfectly price elastic; thus, there is no difference in willingness to pay among project users. Second, and related to the first point, the water project is assumed to have no significant effect on regional recreation supply and, hence, no effect on marginal willingness to pay. Third, to the extent private facilities are used to establish the values, the approach assumes that private recreation facilities are perfect substitutes for the recreation services provided at Corps projects.

Under circumstances where analytical resources are limited and the project output might reasonably meet the assumptions noted above, the unit day value method is a procedurally acceptable NED measurement for the P&G. However, the method is so far removed from the conceptual foundation of the willingness to pay test, and from specific project situations, that benefit based revenue estimates should not be made using the unit day value approach.

Market Prices

At the opposite extreme from the administrative price approach is the use of market prices for products whose production is increased by project output. In this case, the benefit analysis is based upon observed market prices developed from the selling and buying behavior of producers and consumers. These observed prices must, by definition, be on an actual demand curve and so

may be accepted as a revealed measure of willingness to pay. Therefore, use of market price data is especially accurate in assessing cash flow potential.

Actual market prices for a product can be used to develop the demand curves needed to measure consumer willingness to pay if the output of the project will affect availability of a consumer good. For example, if fish harvest increases with versus without the project, then willingness to pay benefits can be estimated by multiplication of the changed output by the average of the estimates of with and without project prices. This approach depends upon accurate prediction of the response of prices to increased production; that is, a price dependent demand function needs to be estimated from available market data. Typically, market prices are used in connection with the net income approach for measuring benefits, and their use in that context will be discussed below.

Simulated Prices

Some project outputs are not exchanged in markets and so there are no observed market prices for output to provide a basis for establishing willingness to pay. For such outputs it is possible to examine individual choice behavior in response to prices in other markets or in simulated markets in order to develop willingness to pay estimates. These simulated market approaches include travel cost and contingent valuation methods for recreation. Also during 1986 the USDA published a new price series for agricultural products which are "subsidy free." Therefore, a simulation of hypothetical market is now the basis for agricultural price analysis. This agricultural price simulation is discussed in the next section.

The travel cost method is applied for recreational benefit estimation and relies upon a statistical analysis of travel behavior to recreational sites to determine how site use varies with the cost of using the site. Travel cost benefits are established for direct users of the site. From this analysis inference can be drawn about how charging alternative hypothetical prices would affect site use. In this manner, it is possible to trace out the points on a demand function suggested by the P&G definition of the NED benefit.

While the travel cost method has conceptual validity for assessing the demand of direct users of a site, there are numerous practical difficulties in its implementation. First, the travel cost approach must be applied to an existing site and then its results transferred to the site being evaluated. Comparability of site characteristics may be difficult to establish. Second, there is no

professional consensus on how "cost" is defined. Should direct financial outlays to get to the site define cost or should opportunity costs of time also be included? Should the cost be offset by recreational experiences along the journey or is the journey itself of value? Third, statistical estimation problems often arise leading to a wide variance in estimates of willingness to pay.

All these matters can be analytically addressed for an NED analysis when "cashing in" the benefits is not necessary. However, if a CFWTP estimate is to be based upon a travel cost study it must be acknowledged that the revenue estimates may have substantial margins of error. On the positive side, the travel cost method is linked to actual choice behavior and at a conceptual level should reflect CFWTP.

The contingent valuation method seeks to ascertain points on the willingness to pay function by administering a questionnaire to a sample of the population near the project. The questions asked seek to elicit statements of willingness to pay for project output. It would be possible to apply this method to other project outputs, such as flood control, however, its use has been confined to recreational benefit estimation. The professional attention to this approach has advanced the state-of-the art substantially, although there is little evidence on whether the results match what would be actual cash flow willingness to pay.

This questionnaire based approach for defining willingness to pay can be subject to several respondent's biases which need to be considered in its application.

- **Hypothetical Bias:** The bidding situation must be realistic enough to enable the respondent to make a sound personal assessment of what they would actually be willing to pay. Such realism means that the output being bid for is carefully explained and the hypothetical market seems realistic.
- **Strategic Bias:** To the extent the respondent feels that their bid will actually result in the making of a cash payment, they may behave strategically and understate their willingness to pay in the expectation that they will still receive the good but others will pay most of the cost. If all behave in this manner then total willingness to pay will be understated. To overcome strategic bias it may be necessary to make the bids seem more hypothetical. Therefore, there is a tradeoff in survey design between creating hypothetical and strategic bias.
- **Payment Vehicle Bias:** Peoples' expressed willingness to pay may be affected by the payment vehicle. Thus, a hypothetical surcharge on property taxes as the payment vehicle may result in different willingness to pay bids than a hypothetical sales tax increase. It is, therefore,

important to select a payment vehicle which is most likely to be used if revenue collection is pursued.

- **Instrument Bias:** The surveys may be sent by mail, administered by telephone or conducted in person. How these surveys are done may affect willingness to pay expressions.
- **Starting Point Bias:** There are two approaches to eliciting willingness to pay bids. One asks for a single estimate of willingness-to-pay; the other offers a starting bid level and then asks how much more (or less) the respondent is willing to pay for the project output. There is evidence that where one starts the "bidding" process may affect the final bid offers. However, the advantage of bidding is that it gives the respondent an opportunity to think more completely about willingness to pay

There are analytical approaches to dealing with all the biases of the contingent valuation method. However, if a CPWTP estimate is to be based upon a contingent valuation approach the analyst must recognize the potential for error. Advantages of this approach for estimating cash flow willingness to pay are that full information on project outputs can be provided to the respondent and willingness to pay to avoid risk situations can be directly measured.

Change in Net Income

Change in net income (profit) to a firm is the approach used to measure benefits of commercial production increases resulting from project outputs such as irrigation water, flood protection (especially for agriculture), and commercial fish population enhancement. Market prices for the firm's product, firm production levels and costs of production are estimated with and without the project output. An increase in net (profit) income to owners of the firm with versus without the project is considered a measure of the firm's willingness to pay for project output. This apparently straightforward method must be carefully applied or the net income changes computed as the NED benefit may not reflect CFWTP. The following matters need consideration.

- Market prices for output may change if the project produces significant increases in supply. Evidence on the slope and position of the market demand function to establish a with versus without project price is needed. (See the previous discussion of market prices).
- The data which is used to evaluate production and cost of production effects must be representative of the firms which will actually benefit from the project. For example,

agricultural production effects must represent the most likely production activities, yield increases and production costs for the affected firms.

- Related to the previous point, it must be demonstrated that the affected firms are using the same data, analysis and decision rules in determining how to alter production in response to the project. This point relates to the P&G assumption that the affected firms have the same information as the planner.
- The affected firms are assumed to be risk neutral. CFWTP may exceed the expected increase in income if beneficiaries are willing to pay a premium for reduced probability of drought or flood damage.
- It was noted earlier that a simulated price series will now be used to establish the benefits of agricultural production. In the past a "normalized" price series based upon a weighted average of past agricultural product prices was used to measure gross income from agricultural product sales. In 1986, the USDA altered the normalized price definition and published normalized prices which are supposed to represent the prices which would prevail if there were no farm price and income supports. To develop these prices a simulation of a subsidy free market price was conducted using an existing USDA computer model. Without regard to the merits of this approach, it is clear that net income benefits estimated with these prices will not reflect CFWTP, because the prices used are not the actual price that will be received by the farm operator.

Alternative Cost

This method of benefit estimation is used for water supply, power and flood control benefit estimation. In effect the method uses the expected costs that would be incurred if the project were *not* built as a measure of project benefits. The cost of an alternative water supply source, an alternative power source or the costs of repair of flood damaged property are examples of alternative cost approaches to benefit estimation. The appropriate use of the approach for the NED benefit analysis rests on two critical assumptions: (1) the analyst has identified the least cost feasible alternative and (2) there is an effective demand for the output. Failure to accurately assess either of these necessary assumptions may misstate the benefits for project output. This can be seen with reference to Figure 7.

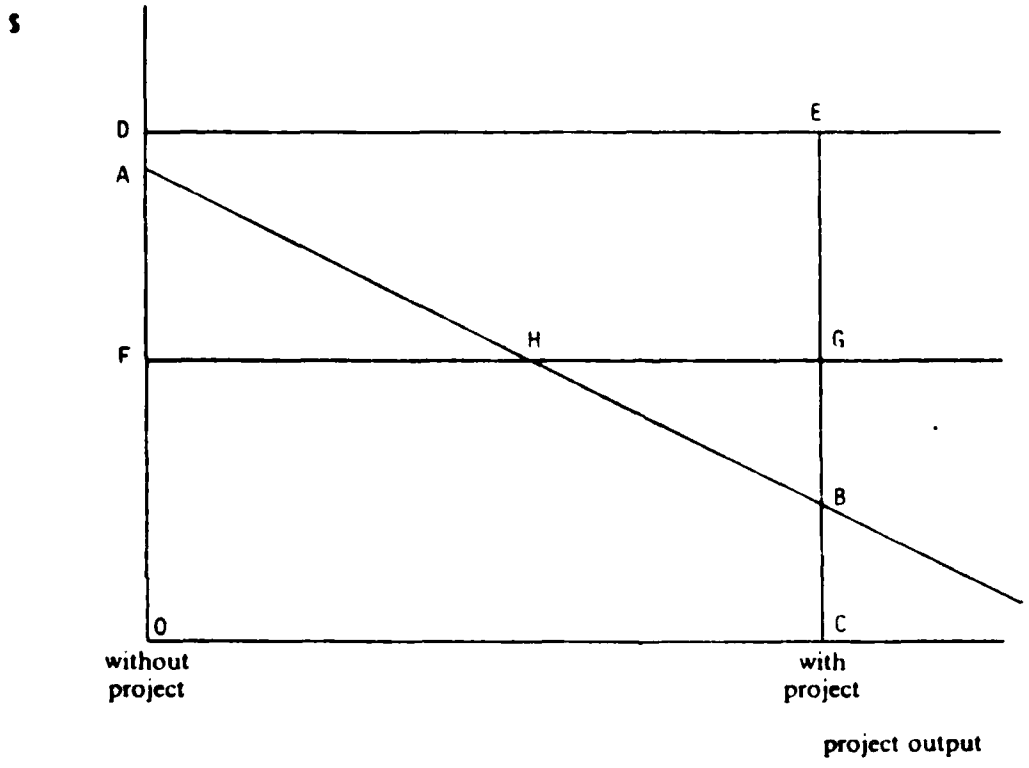

Figure 7. Alternative Cost Measure of Benefits

For the actual demand relationship AB (known only in general terms) CFWTP project benefits are, in fact, OABC. If such benefits are measured by the cost of providing OC by an alternative with unit costs along DE, benefits are estimated as ODEC. In this case alternative cost overestimates willingness to pay of OABC. If a lower cost alternative is found (FG) then alternative cost OFGC underestimates willingness to pay.

Further issues arise in establishing whether alternative cost accurately represents CFWTP. Alternative cost methods assume that the beneficiary has the same information as the planner, follows the same decisions of rule in defining the alternative and is risk neutral. Once again, these matters need careful review and can get quite involved.

Use of Land Market Values

Many of the benefits of water resource projects accrue to owners of land parcels. Thus, increases in land sale values with versus without the project reflect the present value of the improved stream of income (or utility) to the land parcel owner. Lands benefited by irrigation water, flood protection or access to a recreational lake are examples of services which can lead to land price increases. Because the land prices would increase by the present value of the land buyers and sellers expectations for future benefits from the project, it provides the most accurate measure of beneficiaries revealed willingness to pay for project outputs. However, the statistical analysis needed to separate out the effects of water projects on land prices are difficult to perform and may be subject to estimation error. Also, land price analysis must be done for one site and then the results transferred to the proposed project site. Here too errors in application may arise.

Two issues should be recognized in using the land price approach to benefit estimation. First, the land market's discount rate may differ from the project analysis rate. Annualizing of land market prices at the project discount rate to establish annual benefits may misstate both the NED benefit and the CFWTP benefits.

Second, the P&G directs that inflation not be included in an NED analysis. Within the NED framework this is a justifiable analytical position. However, there is evidence that the market value of fixed assets such as land do change with expectations of inflation and deflation. Thus, the land market prices may include both a reflection of the net income (utility) potential of the project and inflationary expectations. If CFWTP for a land parcel over time is to form the basis for a benefit

based recovery scheme, then the tax base will grow with inflation and potential benefit based revenues will exceed those computed for the inflation free assumption of the P&G.

ESTIMATING BENEFIT BASED REVENUES: THE CHALLENGES

The requirement to conduct an NED analysis will remain in place. At the same time local sponsors will be faced with the need to pay a share of the costs of project planning and implementation. Therefore, some sponsors may seek to recover costs from project beneficiaries and might turn to the NED analysis as a starting basis for making an estimate of the cash flow potential from charging project beneficiaries. Cash flow willingness to pay does not conceptually match the P&G definition of an NED benefit, although the concepts are closely aligned. In assessing cash flow potential, adjustments to the NED concept must be made to recognize limited information, risk attitudes and inflation. Some of the P&G benefit estimation methods do promise more accuracy in measuring CFWTP and are more suitable for benefit based revenue estimation. Methods that are tied more closely to revealed (in actual or hypothetical markets) behavior of project users will better reflect CFWTP because they are focused upon evaluating benefits in terms of the determinants of the demand function. In this regard the market price/net income and land price approaches should be favored. Simulated market methods would be the next most accurate methods for measuring CFWTP and alternative cost and administrative prices should be considered only where other approaches are impractical.

In conducting a planning study it should also be recognized that the benefit analysis may be a starting point for local political negotiation over cost allocations among benefited groups. An issue facing a project sponsor is not defining the absolute level of benefits, but rather is defining *relative* benefits received by different groups affected by the project. It is these relative benefit shares which will form the basis for allocating project costs among users or for making the argument that local cost shares should be taken from general tax revenues. The ultimate allocation of project costs among those who will pay is not a technical problem but rather is a political bargaining problem. A benefit analysis may provide a starting point for the political bargaining by establishing a first estimate of the share of costs that might be assigned for project beneficiaries. Of course, in the process of the political negotiation over shares of costs, information may be revealed which helps improve the benefit estimates. As a result, benefit estimates might become part of a political bargaining process. While this is a valuable contribution to the planning process, it also means that

an intense review of benefit estimates by the project beneficiaries should be expected. Thus, the new cost sharing environment created by PL 99-662 will place a premium on benefit estimation "accuracy."

The NED analysis of the P&G was developed in an era when the federal government bore most of the costs of project construction and there was little need to recover costs from project beneficiaries. CFWTP analysis will focus attention of project beneficiaries upon what benefits they receive in relation to the costs they bear, and upon the accuracy of such benefit estimates. Therefore, CFWTP *benefit estimation must replace* NED *benefit searching* within the project planning process and will directly alter the traditional plan formulation process.

The traditional plan formulation approach, as well as the effect of PL99-662 on plan formulation, can be described, in an admittedly simplified manner, using Figure 8. In the traditional approach, project performance standards were judgmentally established in the design process. This defined "project scale." A total cost function to achieve that performance standard was defined by the application of engineering design standards. An example of a performance standard is the selection of the Standard Project Flood level of protection for a flood control project. Another example is the desire to develop a site to its maximum storage potential. The shape and position of the cost function which is depicted includes within its development the application of design standards. An example of a design standard is the minimum slope on a levee section. Another example is the requirement for minimum freeboard on a levee. In fact, the project cost function of Figure 8 had imbedded in it the designers judgements on minimum acceptable performance and design rules. (See L. Shabman "Risk Based Decision Making and Project Integrity: The Challenge of the New Project Financing.")

Once the scale-cost relationship was established, quantification of project benefits proceeded. If benefits were clearly inadequate to cover the minimum design costs, then the project would be abandoned rather than scaled back If the benefits came close to covering costs then a process of "benefit searching" began, seeking other categories of benefits and/or approaches to benefit estimation to justify the chosen project scale.

If this practice continues and the benefit searching process becomes active under PL 99-662, there may be three effects. First, if a benefit searching activity is initiated in the more open planning process under PL 99-662, the resulting benefit estimates will become politically more suspect and may undermine project support. Second, at larger project scale benefit searching will tend to focus

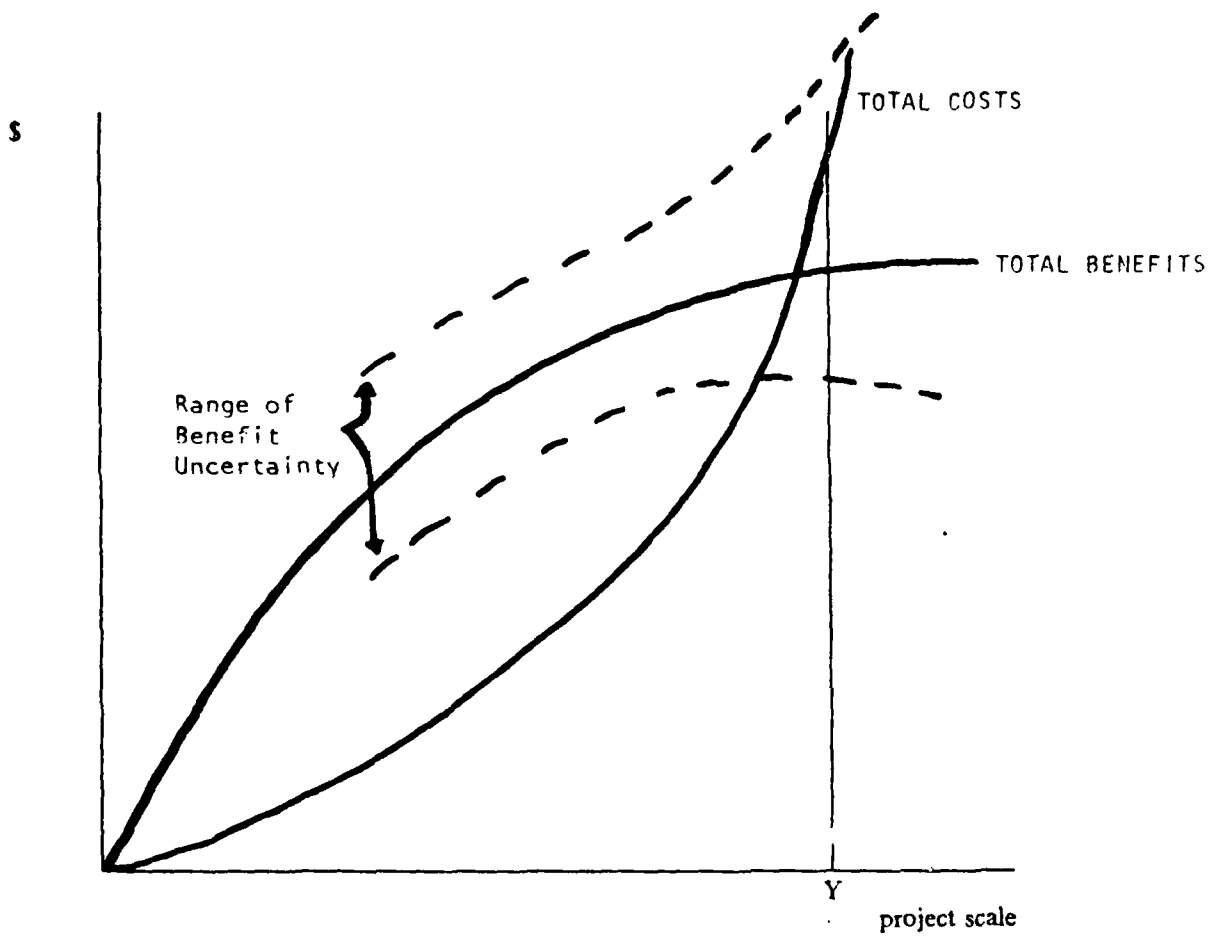

Figure 8. Project Plan Formulation

on less vendible services such as risk reduction (ex. SPF protection), recreational use and promoting economic growth. Third, as SPF protections marginal benefits decline while marginal costs increase; therefore, any suspected inaccuracy of the benefit estimate makes it more likely that marginal benefits will not exceed *marginal* costs as costs rise and benefits fall with scale. The range of uncertainty about the benefit estimate, shown as the dashed functions of Figure 8, makes clear that there is a greater likelihood of marginal benefits falling below marginal costs for larger project scales.

Figure 8 can be used to translate these arguments into the context of this paper's total discussion to this point and can illustrate the effect of the effort to identify benefit based revenues (CFWTP) on plan formulation. If the focus is placed on the marginal increments to project scale, as the project scale approaches Y in Figure 8 some general implications for plan formulation can be illustrated.

- There may be a positive willingness to pay for risk reduction which will result in CFWTP benefit estimates in excess of NED estimates. This will increase the local sponsor's view of the excess of benefits over costs and make it more likely that project benefits will provide cash payments to offset costs.
- The perceptions (information) individuals have about the project services will affect their willingness to pay for a share of project costs. It is not certain how this information will affect CFWTP benefits, but credible information, education and public participation programs in planning will enhance the possibility for benefit based revenue collection.
- Benefit measurement error increases the uncertainty about the future benefit streams. As marginal benefits approach marginal costs the possibility that measured benefits will be less than costs increases. In one case uncertainty of benefit based revenue projections will make it difficult to debt finance projects at scale Y, because uncertainty over future project benefit and use levels translates into uncertainty about future revenues. If user fees are to be set in relation to benefits, users must be satisfied that the benefit estimates are accurate and that projected use levels which determine cash flow will in fact occur. However, even if general obligation bonds are used to debt finance the local cost share, building political support for using general revenues to service debt will require greater certainty in benefit estimates.

Reducing revenue uncertainty will require careful consideration of factors, including pricing strategies and demand price elasticity, which will affect future demand for project

outputs; that is, "market analyses" paying particular attention to the price elasticity of demand must receive high priority in planning reports. To illustrate, the potential revenues from a variable tonnage fee at a port will depend upon the competitive position of the port over time. Therefore, the concern for accuracy of use and benefit projections must be more than an abstract planning exercise because establishing the marketability of bonds and the ability of non-Federal interests to repay bonds, as well as political support for the project, will be based upon sound estimates of projected use. Staging project construction over time may replace building of longer scale projects as a means of dealing with revenue projection uncertainty.

Many project benefits are vendible only if added costs are incurred to develop revenue collection institutions; for example, special tax districts may need to be developed to levy a land increment tax for property protected from flooding. These costs of developing collection institutions raise total project costs, once the easily captured revenues are realized. If the benefit searching process requires less vendible purposes (such as recreation) to justify project scale the costs of revenue collection may discourage inclusion of these purposes in the project. The result will be smaller scale projects serving more vendible purposes.

- Cost share rates less than 100% shift the local costs below the total cost function shown in Figure 8. If the project planner has selected a scale Y without regard to CFWTP benefits, there may be some reluctance to pay for the project scale as the cost share rate rises. Therefore, projects will be scaled back if purposes (such as water supply) with 100% recovery from the project sponsor are needed for justifying the project scale Y.
- Design rules which increase project costs make project scale Y less affordable by shifting the cost function upward. Affordability concerns will focus attention on practices in hydrology and engineering design which put upward pressure on the project cost function.

CONCLUSION

The water project planning environment has been altered by PL 99-662, however, the nature of the changes can only be speculated upon at this time. Two general results of PL 99-662 are suggested by this paper. First, the procedures for NED benefit analysis need to be selected more carefully if willingness to pay values of project benefits are to better represent cash flow potential. In this regard, there will be increased pressure to improve benefit estimation "accuracy" in project planning, wherever real as opposed to hypothetical (NED) cash flow potential is to be estimated.

Second, the benefit analysis process may need to occur simultaneously with plan formulation rather than after plan formulation. This may put pressure on the traditional planning practices.

GLOSSARY OF TERMS

ADJUSTABLE RATE BOND. A bond for which interest paid is adjusted periodically by the issuer to reflect changes in market interest rates. See Variable Rate Bond.

AD VALOREM TAX. A tax based on the assessed valuation of property.

ADVANCE REFUNDING BONDS. Bonds issued to refund an outstanding bond issue prior to the date on which the outstanding bonds become due or callable. Proceeds of the advance refunding bonds are deposited in escrow with a fiduciary, invested in U.S. Treasury Bonds or other authorized securities, and used to redeem the underlying bonds at maturity or call date and to pay interest on the bonds being refunded and the advance refunding bonds.

ARBITRAGE. Use of bond or note proceeds financed at tax-exempt rates for reinvestment at higher, taxable rates. Vigorously regulated by the Internal Revenue Service.

ASSESSED VALUATION. The valuation placed on property for purposes of taxation.

BASIS POINT. 1/100th of 1% in bond yield or interest rate. The difference between 10% and 10.25% equals 25 basis points.

BOND. A written promise to repay the principal amount of a debt at maturity with periodic payments of interest (customarily every six months).

BOND ANTICIPATION NOTE. A note which the issuer uses to obtain interim financing for a project or projects, in anticipation of future bond proceeds.

BOND BANK. A state-chartered organization which purchases the bonds of local governments and issues its own bonds backed by the pool of local bonds.

BOND COUNSEL. A law firm which renders an opinion concerning the validity of a securities issue with respect to statutory authority, constitutionality, procedural conformity, and usually the exemption of interest from Federal income taxes.

BOND ORDINANCE OR RESOLUTION. An ordinance or resolution authorizing a bond issue.

CALLABLE BOND. A bond which is subject to redemption at the issuer's option prior to maturity at a specified price at or above par.

COMPETITIVE UNDERWRITING. A sale of municipal securities by an issuer in which underwriters or syndicates of underwriters submit sealed bids to purchase the securities. See Negotiated Underwriting.

COUPON RATE. The interest rate on a bond specified as a percentage of principal amount. The term is synonymous with nominal interest rate. See Yield.

COVENANTS. Specific provisions contained in all bond resolutions and trust indentures of an issuer to assure maintenance of continued financial and operating performance.

COVERAGE. The ratio of net revenue available for debt service (i.e., net of O&M expenses) to the average annual debt service requirements of a bond issue (usually revenue bonds).

CREDIT RISK. Risk of default.

CREDIT SUPPORT. Guarantee of debt and timely payment of principal and interest provided by third party (bank or insurance company) in return for a fee. Also called Credit Enhancement.

DEBT LIMIT. The statutory or constitutional limit of the amount of gross or net debt a municipality may issue or have outstanding. Also called a Debt Ceiling.

DEBT SERVICE. Required payments for principal and interest for retirement of a bond or note.

DEBT SERVICE RESERVE FUND. A fund established to account for the accumulation of resources for and the payment of debt service. Formerly called a sinking fund.

DEDICATED TAX BOND. A bond secured by pledge of the revenues from a particular tax source such as a gasoline tax. Also called a special tax bond.

DEFAULT. Failure to pay principal or interest when due.

DEMAND BOND. A bond which the holder may at his option "put back" or "tender" to the issuer prior to maturity. Also called Put Bond or Tender Option Bond.

DISCOUNT. The amount, if any, by which the principal amount of a bond exceeds the market price.

DOUBLE-BARRELLED BONDS. Bonds secured and payable from both an identified revenue source and taxes or general revenues.

FINANCIAL ADVISOR. A consultant to an issuer of municipal securities who provides advice with respect to the structure, timing, terms, or other aspects of a new issue.

FINANCIAL PLAN. An approach to financing capital improvements which optimizes the sponsor's funding sources and uses of capital from the standpoints of cost, risk, and financial flexibility.

FIXED-RATE BOND. A bond for which the coupon rate is fixed from the date of issuance to final maturity.

GENERALLY ACCEPTED ACCOUNTING PRINCIPLES (GAAP). Uniform minimum standards of and guidelines for financial accounting and reporting, governing the form and content of basic financial statements.

GENERAL OBLIGATION BOND: A bond secured by pledge of the issuer's full faith, credit and taxing power.

GOVERNMENTAL BOND. A bond issued for general governmental purposes and for which interest is exempt from Federal taxes under the Internal Revenue Code.

GRANT ANTICIPATION NOTES. Notes issued in anticipation of a grant or grants.

GROSS DIRECT DEBT. The total amount of bonded debt of a government (general obligation bonds plus revenue bonds) plus unfunded debt (typically short-term notes).

INDUSTRIAL DEVELOPMENT BOND (IDB). A bond secured by a pledge of the lease revenue from publicly-owned industrial facilities. Also called Industrial Revenue Bond (IRB). IDB's are a type of private activity bond.

INSURANCE. A guarantee of timely payment of principal and interest by an insurance company or syndicate.

INTERIM FINANCING. Short-term financing of project development and construction, requiring refunding.

ISSUER. A state, political subdivision, agency, or authority that borrows money through the sale of bonds or notes.

LEASE. A contract under which a lessee agrees to make periodic payments to a lessor for use or benefit of a facility.

LETTER OF CREDIT. Contractual obligation by a bank to pay principal and interest in the event of issuer default. Bank is usually AA or AAA-rated.

LIQUIDITY RISK. Risk of a cash shortfall; in particular, risk that cash will not be on hand to redeem bonds tendered by bondholders.

LIQUIDITY SUPPORT. Contractual obligation (by a bank or insurance company) to assure refinancing of bond or note principal upon demand by a bondholder.

MARKETABILITY. A measure of the ease with which a security can be sold in the secondary market.

MARKET RISK. The risk to bondholders that changes in prevailing market interest rates will adversely affect the price of the bonds they hold.

MATURITY. The date when the principal amount of a bond is due and payable.

MORAL OBLIGATION BOND. A typical bond that is not backed by the full faith and credit of a State, but for which under State law, the State will replenish the issue's debt service reserve fund, if necessary. Often used in connection with a bond bank.

NEGOTIATED UNDERWRITING. A sale of municipal securities by an issuer in which the issuer chooses one underwriter or group of underwriters to sell its bonds to investors. See Competitive Underwriting.

NET DIRECT DEBT. Gross direct debt of a municipality less all self-supporting debt, any sinking funds and any tax, revenue or grant anticipation notes. Similar to total general obligation debt.

NOTE. A written promise to repay a debt and interest thereon at a specific maturity date, usually short-term (one to three years), secured by specific sources of revenues such as taxes, grants or bonds.

NOTICE OF SALE. An official document disseminated by an issuer of municipal securities that gives pertinent information regarding an upcoming bond issue and invites bids from prospective underwriters.

OFFERING PRICE. The price at which members of an underwriting syndicate for a new issue will offer securities to investors.

OFFICIAL STATEMENT. A document prepared for an issuer by a financial advisor or investment banker describing the legal and financial terms of a financing and pertinent financial economic and engineering information about the issuer and the project. It is used to offer bonds to investors.

ORIGINAL ISSUE DISCOUNT BOND. A bond, repayable only at maturity, which bears a reduced interest rate and is sold at a discount to provide a return to the investor. Also called "Capital Appreciation Bonds" or "Deep Discount Bonds". See Zero Coupon Bond.

OVERLAPPING DEBT. That portion of the debt of other governmental units for which residents of a particular municipality are responsible (e.g., for services or facilities shared by several municipalities).

PAYING AGENT. Place where principal and interest are payable. Usually a designated bank or the office of the treasurer of the issuer.

PREMIUM. The amount, if any, by which the market price exceeds the principal amount of the bond.

PRINCIPAL AMOUNT. The face amount of a bond, usually in $5,000 denominations. Also called par or par value.

PRIVATE ACTIVITY BOND. A bond issued for other than general governmental purposes. Generally, interest on private activity bonds is taxable, unless specifically exempted from Federal taxation under the Internal Revenue Code.

RATE COVENANT. A trust indenture (usually for revenue bonds) to maintain rates and charges sufficient to pay all operating and maintenance expenses, annual debt service and reserves and to provide a specific level of coverage.

RATING. A designation used by analysts in investor's services to represent the relative quality or creditworthiness of a bond issue. Moody's ratings range from the highest, Aaa down through Aa, A, Baa, Ba, B, etc. Standard & Poor's uses the symbols AAA for its highest rating, then AA, A, BBB and BB, etc.

REFUNDING. Repayment of a debt with the proceeds of a new debt instrument. Also called refinancing.

REVENUE ANTICIPATION NOTES. Notes issued in anticipation of other sources of future revenue.

REVENUE BOND. A bond secured solely by a pledge of a specific revenue source, usually net or gross project or system revenues, without recourse to any tax support. May also be secured by a mortgage on project or system property.

SECONDARY MARKET. The trading market for outstanding bonds.

SERIAL BONDS. Bonds whose principal is repaid in annual or semi-annual installments over the life of the issue. Serial bonds in which the annual installments of bond principal are so arranged that the combined payments for principal and interest are approximately the same each year are called serial annuity bonds.

SPECIAL ASSESSMENT. A compulsory levy made against certain properties to defray part or all of the cost of a specific improvement or service deemed to primarily benefit those properties.

SPECIAL ASSESSMENT BONDS. Bonds payable from the proceeds of special assessments. If the bonds are payable only from the collections of special assessments, they are known as special assessment bonds. If, in addition to the assessments, the full faith and credit of the government are pledged, they are known as general obligation special assessment bonds.

SPECIAL DISTRICT. An independent unit of local government organized to perform a single governmental function or a restricted number of related functions. Special districts usually have the power to incur debt and levy taxes; however, certain types of special districts are entirely dependent upon enterprise earnings and cannot impose taxes.

SPECIAL SERVICE AREA BOND. A bond secured by pledge of the revenues from a special service tax applied to a limited geographic area.

TAKE AND PAY CONTRACT. A contract obligating a purchaser to pay for a good or service to the extent that it uses the good or service.

TAKE OR PAY CONTRACT. A contract obligating a purchaser to pay for a good or service whether or not it uses the good or service.

TAX ANTICIPATION NOTES. Notes issued to finance current operations in anticipation of future tax receipts.

TAX BASE. The total property and resources subject to taxation.

TAX-EXEMPT COMMERCIAL PAPER. Short-term debt, with maturities usually ranging from 15 days to 180 days, payable from revenues or refinanced by issuance of additional notes, bonds or paper.

TERM BOND. A bond of an issue which has a single maturity.

TRUST INDENTURE. The contract between bondholders and an issuer securing the repayment of debt. It sets forth how all monies of issuers will be applied to pay operating costs, repaying debt, funding reserves and using surplus revenues and construction funds. The document also specifies all covenants of an issuer.

TRUSTEE. A bank designated by the issuer as the custodian of funds and official representative of bondholders. Trustees are appointed to insure compliance with the trust indenture and represent bondholders to enforce the trust indenture.

UNDERWRITE. To purchase a bond or note issue from the issuer for the purpose of resale to investors.

VARIABLE RATE BOND. A bond for which interest paid changes periodically according to a prescribed index or specific formula which reflects changes in market interest rates. See Adjustable Rate Bond.

VARIABLE RATE DEMAND OBLIGATION. A note or bond with a variable interest rate which may be tendered by the holder prior to maturity.

YIELD. The net annual percentage return from an investment. Yield is based on interest as a proportion of market value, not of principal amount. See Coupon Rate.

YIELD CURVE. A graph which reflects the market yields on bonds of various maturities from 1 to 40 years. Typically, the yield curve "ascends", showing progressively higher yields on longer maturities.

ZERO COUPON BOND. A non-interest bearing bond, repayable only at maturity, sold at discount to provide a return to the investor. The ultimate Original Issue Discount Bond.

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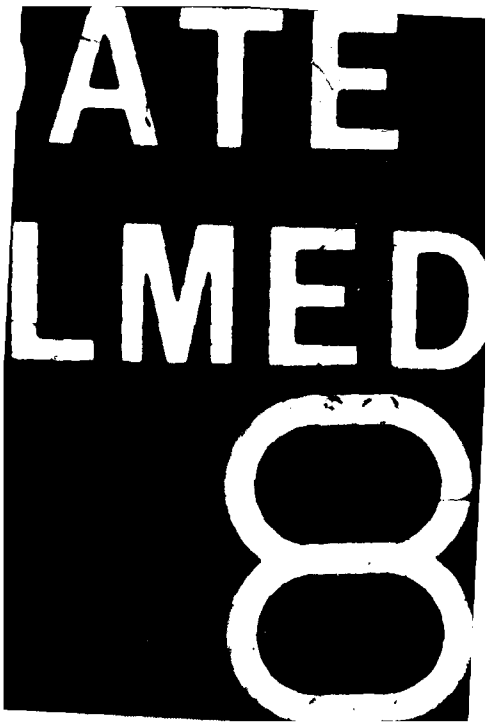
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